

DOCUMENT RESUME

FD 119 086

CG 010 395

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TITLE Cognitive Styles and the Social Order. Final Report, Part II. O.E.O. Study B00-5135, "Thought, Race, and Opportunity."
INSTITUTION Office of Economic Opportunity, Washington, D.C.
PUB DATE Jul 71
NOTE 194p.; Light print areas throughout document
EDRS PRICE MF-\$0.83 HC-\$10.03 Plus Postage
DESCRIPTORS Achievement; *Cognitive Development; *Cognitive Processes; Data Collection; *Racial Factors; Research; Social Influences; *Social Stratification; Socioeconomic Influences; Surveys; *Theories

ABSTRACT

This report presents data developed for testing the theory that there are social processes which result in differing cognitive styles for subdominant and dominant social groups. The results of surveys of black and white persons in an urban area, of white rural farmers, and Hopi Indians are presented. The research attempts to integrate data and theory from three levels of inquiry: neurological theory of lateral specialization for verbal and visual brain functions; theory pertaining to visual and verbal contents of human intelligence, and a theory of social stratification which relates cognitive performance to differences in group access to modes of thought and socioeconomic rewards. The report includes descriptions of the survey sampling designs and research instruments, the data on the performance measures, and the data testing of research hypotheses. The research results are discussed in terms of achievement outcomes and the implications for the educational system and society. (SJI)

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COGNITIVE STYLES AND THE SOCIAL ORDER

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Final Report, Part II. O.E.O. Study
B00-5135, "Thought, Race, and
Opportunity."

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July 1971

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ACKNOWLEDGEMENTS

A great number of people have contributed to the theory and research presented in this report. The author is especially indebted to Professor John F. Marsh, Jr., a principal investigator, and to Dr. Joseph E. Bogen, whose work forms much of the basis for Chapter I, and whose advice and consulting have been invaluable. Charles Kaplan was a co-investigator in the Hopi study, and assumed major responsibility for writing Chapter VII.

Many persons made important intellectual contributions to the study, notably Diana TenHouten, who was instrumental in formulating nearly every stage of the research, theory, and analysis. Helpful contributions were also made by Professors Charles Rusch, Barbara Williams, Ronald DeZure, Paul Bakan, David Galan, and Tommy M. Tomlinson.

TransCentury Corporation did the field study, and helpful consultation were provided by Robert Burns, Sharon Costello, David Listenbee, Judy Parker, and Kirk Saunders. Karen Mitchell handled much of the administrative work. Joan E. Laurenze, Barbara Hinker, and Carol Whalen are also thanked.

Timely help in data analysis was provided by Hugh Greenup and Faye Sabin, and Suzanna De Rooy typed the entire manuscript.

COGNITIVE STYLES AND THE SOCIAL ORDER

I. INTRODUCTION

In 1970 the U.S. Office of Economic Opportunity funded a survey research project entitled "Thought, Race, and Opportunity". The author's participation as co-principal investigator (with John F. Marsh, Jr.) followed exposure to two distinct investigations. Joseph E. Bogen, a neurologist, has been involved, with his co-workers, in developing neurological theory of specialization of the two hemispheres of the brain; Marsh has carried out survey analyses of two modes of nonverbal racial stereotyping. Connections between these studies led the author to hypothesize there may be social processes which result in differing cognitive styles for subdominant and dominant social groups, whereby dominant groups primarily use propositional, left-hemisphere functions, and subdominant groups primarily use non-propositional, right-hemisphere functions. That is, it is hypothesized that use of the cerebral hemispheres may result from social forces.

In this report, data developed for testing this theory will be presented. Surveys of black and white persons in an urban area, of white rural farmers, and Hopi Indians will be reported on.

In addition, some extensions of the theory will be presented; part of this extension can be tested with existing data, and part

of it must await further empirical research. At its present level of development, the research integrates data and theory from three levels of inquiry: neurological theory of lateral specialization for verbal and visuospatial brain functions; theory pertaining to verbal and visual contents of human "intelligence"; a theory of social stratification relating differences in group access to modes of thought and access to socioeconomic rewards for differing performances.

In addition to these substantive areas, methodologies will be employed in testing and elaborating the theory. First, a method called "discriminant analysis through theoretical sampling" manifested itself in the analysis of race and sex differences in cognitive performances; second, Guttman's analysis of the structure of order(1954) is employed to extend the theory into higher level components of cognitive organization.

Given the interdisciplinary scope of this inquiry, it is emphasised--at the outset--that the theory presented here is as yet an incomplete structure which still is in progress. Some theoretical bases for the present paper, however, derive from traditional research and theory. The surveys presented are shown to support the theory, and constitute a preliminary step in its empirical validation.

The report is organized as follows: First, a summary argument of the neurological theory is described, along with the sociological theory of cognitive styles and social stratification. Second, the survey research sampling designs and research instru-

ments are described. At this point, an extension of the theory, to consider the "principal components" of cognitive organization, is presented. Third, data on performance measures are described, and data testing the initial hypotheses presented. A discriminant analysis indicated this theory is consistent with the survey outcomes for race and sex groups in the adult samples. Fourth, an overview of the adult sample is provided. These other dimensions of cognitive styles are then related to the performance measures.

II. VERBAL AND VISUOSPATIAL THOUGHT

A recent paper by Jensen (1969a) contending that blacks may be relatively stronger in associative (visual, spatial, and non-verbal) thought, and relatively weaker in conceptual (verbal) thought, and the furor surrounding this paper (see Jensen, 1969b; Light and Smith, 1969; Deutsch, 1969) illuminate the need for conceptually and empirically adequate research. An immediate suggestion is that attention may be focussed on the processes and structures of verbal and visuospatial modes of thought in the brain. This discussion, therefore, summarizes neurological and psychological theories of such differentiation of thought. The definitions and concepts thus provided form a conceptual framework for the social theory following. Thus concepts from neurology are employed in a theory of social stratification, but this does not imply a "biological reduction" of social phenomena, for three reasons. First, while neurological concepts appear in the theory, no propositions relating these concepts appear: thus, nothing is deduced from the biological level. Second, it is hypothesized that the direction of causality works the other way, i.e., social forces may be at work which cause some groups to specialize in left-hemisphere thought and other groups in right-hemisphere thought. And third, no assumption is made that there exist physiological capabilities for reasoning between racial and social groups; moreover, no assumption is made that there exist physiological

capabilities within any social groups. For this reason, the word intelligence is used in quotations, and test scores are regarded as measures of "performance".

Just as no reduction of the social to the biological to the social is carried out, neither is the opposite. The human brain is an instrument of discovery and an instrument used in all social interactions. Certainly one might expect that use of existing knowledge of how the brain works could facilitate the formulation of social theory. Thus, it is sufficient to observe that events which occur socially also happen physiologically; to the extent that such classes of events are observable at differing levels of analysis, empirical generalizations, whether neurological, psychological, or sociological, should be inter-consistent.

Verbal and Visuospatial Thought Processes

A primary characteristic of the cerebrum is that it is double, one hemisphere being the gross mirror image of the other.¹ The two hemispheres weigh the same and have like metabolic rates. Bogen writes (1969a) that "...the informational capacity of the one is just as great as the other; or, put differently, the other (right) is not only working just as hard, but also just as intricately." (p. 105)

There exists impressive empirical evidence that the two sides of the brain (hemispheres) differ in their primary cognitive functions. To a large extent the left hemisphere dominates the functions of speech, reading, and writing.² More generally,

the left hemisphere is specialized in verbal activity and linguistic thought. The distinguishing feature of the left hemisphere is not its possession of words but its use of words in propositions (sequences of words in which the meanings of the words are interdependent.) A general term for this "left-brained"³ thought, then, is "propositional" thought (Jackson, 1958 p.130 ff; Bogen, 1969b pp. 147-148).

Hughlings Jackson wrote (1958) in 1865: "If, then, it should be proved by wider evidence that the faculty of expression (propositional thought) resides in one hemisphere, there is no absurdity in raising the question as to whether perception--its corresponding opposite--may not reside in the other." (p.43, cited in Bogen, 1969a) Given that the right hemisphere is "working just as hard" as the left, one might expect that Jackson's question would have generated neurological research on the structure of right hemispheric thought. But Bogen writes that neurologists of the late nineteenth century came to be preoccupied with localization of functions in the left hemisphere. As late as 1926 the right hemisphere was believed to carry out only "automatic" functions, and was assumed to be manifestly inferior to the "dominant" left hemisphere. Thought which was neither verbal nor propositional was not viewed as warranting investigation. Henschen (1926), e.g., suggested that the "minor" hemisphere might be a "regressive" or a "reserve" organ. In the 1930's, however, the "other side of the brain" began to receive serious attention. Since that time, evidence obtained from normal and brain-damaged persons by

a diversity of sources indicates that there may be two primary modes of thought, one dominated by the left hemisphere and the other by the right. The right hemisphere has come to be viewed as dominant for certain visuospatial tasks, including understanding of music and other art forms, shape and face recognition, and thought based on simultaneous grasp of related but differing phenomena which Bogen (1969b) has named "appositional thought". In the following paragraphs data pertaining to the hemispheric specialization of propositional and appositional thought in the left and right hemispheres of the brain is described. The studies are purposively selected to maximize explication of the structure of the two modes of thought.

"Verbal Intelligence" versus "Performance Intelligence"

In the 1930's, psychologists began to use tests standardized on "normal" persons in studies of neurological patients. Weisenburg and McBride (1935) employed an extensive battery of tests in a study of over 200 aphasic (unable to use or understand words) and non-aphasic persons. In discussing the results of this investigation, they report:

The pathological material affords ample evidence that language plays a tremendous part in thinking and intelligent behavior (but) at the same time it is evident that purposeful and effective thinking may be carried through when language is extremely inadequate or confused and must therefore depend on nonlinguistic symbols such as visual or kinesthetic images. (p.425)

...cases of right-sided lesions without aphasia do not simply manifest a slighter degree of the aphasic condition (but are) qualitatively unlike low grade normals;

and the changes they show are almost the reverse of the aphasic changes (that is, they do poorly on tests which) involve the appreciation and manipulations of forms and spatial relationships. (p. 329)

Wechsler (1941) assembled a battery of tests divided into six subtests of "verbal" intelligence and five subtests of "non-verbal" or "performance" intelligence. Anderson (1951) reported that patients with left sided lesions experienced greater deficits in the verbal subtests while patients with right side lesions experienced greater deficits in performance subtests. Although insufficiently rigorous, the results of this research have been upheld by a number of authors using these and related tests.⁵ These later studies which employ tests standardized on "normals", however, may be limited in applicability to pathological cases. Smith (1966) has emphasized the frequent failure to match patients by age, education, and the specific site of the lesion. In summary, these standardized psychometric methods have produced suggestive, but not conclusive, evidence for the theory of hemispheric specialization.

The concept of two modes of thought has been developed by many psychologists. Pavlov regarded human thought as divided into two signaling systems. The first signaling system concerns perceptions of the real world (appositional), and the second signaling system language and abstraction (propositional). He is quoted by Prolov (1937) as saying: "...the mass of human beings can be divided into thinking, artistic, and intermediate types. The last

name combined the work of both systems in the requisite degree." (p.74) Pavlov's view may be derived from Sechenov (cited in Luria, 1966b, p.74), who hypothesized that the cerebrum has two basic forms of integrative activity, which are organized into "simultaneous and primary spatial groups" and into "temporally organized successive events." Bogen (1969b) writes that although this distinction "...suggests no lateralization, it implies what may well be the most important distinction between the left and right hemisphere modes; that is, the extent to which a linear concepts of time participates in the ordering of thought." (p.160ff) This concept can be extended to viewing propositional thought as reasoning through substructive partition of phenomena (including time), and appositional thought as focussing on reasoning through constructive consideration of the totality of phenomena (including time).

Freud (1946), though of a radically different theoretical orientation than Pavlov, perceived the same duality in cognition. He regarded "primary process" thought as concrete rather than verbal, having a more mobile "cathexis", and employing pictorial images; "secondary process" thought develops with language usage (p.119ff).

Perhaps the primary exponent of spatial ability as an independent factor in mental tests was Macfarlane Smith (1937, 1964). He argues that tests which load heavily on the k-factor (spatial ability) involve ability to perceive or recognize the structure of

a figure as a whole, as opposed to ability to recognize details. When Spearman read Smith's 1937 thesis, he was reluctant to admit to the existence of a spatial factor (Smith, 1966, p.204). Yet by 1950 Spearman expressed a similar point of view:

The senior writer happened to notice that such tests can readily be performed in two distinct manners. One may be called analytic in the sense that attention wanders from one element of the figures to another. The other mode of operation is comparatively synthetic in that the figures (or their constituents) are mentally grasped in much larger units (sometimes called 'wholes').

Factor analytic research by Spearman and Jones (1950) produced a typology of three factors, "verbal", "spatial", and "general". One view of the "general intelligence" factor might be that it reflects cooperation of appositional and propositional thought. Physically, this integrative functioning is carried out via the corpus callosum--the part of the brain connecting the two hemispheres.

Jensen (1969a) has suggested there are two basic modes of thought, which he labels Level I and Level II. He writes:

...I have hypothesized two genotypically distinct basic processes underlying this continuum, Level I (associative ability) and Level II (conceptual ability). Level I involves the neural registration and consolidation of stimulus inputs and the formation of associations. Level I ability is tapped mostly by tests such as digit memory, serial rote learning, selected trial-and-error learning with reinforcement (feedback) for correct responses, and in slightly less "pure" form by free recall of visual or verbally presented materials, and paired associations...(pp. 110-111).

As an example of Level I thought, Jensen notes (1969a, pp. 111-112) that minority and lower-class children can learn the names of 20 or 30 children in a few days, and will quickly pick up the

the rules and know-how of games. He adds that these children are faster at learning new and unfamiliar things. Certainly these non-test performances involve appositional thought.⁶

One difficulty with the above analysis is that the tests do not coordinate with the conceptual distinction: it would seem that digit memory and serial rote learning may involve left hemisphere, non-appositional, thought. The Jensen study is considered in more detail in the next section.

Unilateral Cerebral Damage

Lateral specialization in the left and right hemispheres is usually inferred from the effects of unilateral cerebral damage. If persons who have lesions in certain areas of the brain are rendered less able to carry out a given mental function, it can be inferred that the damaged area is involved in the performance of that function.

Disorders of spatial thought are often associated with bilateral or diffuse brain damage, but may also occur when a lesion is restricted to one hemisphere (Neilsen, 1937). Critchley (1953) found that for 12 patients with disorder of spatial thought, unilateral damage was thought to occur on the left side in one patient (not verified) and on the right side for the remaining 11 patients (nine verified). He carefully concluded that:

...the clinical occurrence of marked disorder of spatial thought should... lead to the strong suspicion of a lesion of the territory linking the parietal, occipital, and temporal lobes. Other things being equal, it is the right... side of the brain which comes under greater suspicion.

Hecaen (1962) summarized findings in 415 patients with various lesions in the posterior of the brain. Generally, disorders of spatial thought were associated with right hemispheric lesions. Of 59 cases with unilateral spatial agnosia, 15 were right hemisphere lesions, and 3 or 4 persons with left hemisphere lesions were left handed; inability to identify faces (prosopagnosia) occurred in 22 patients of whom 4 had bilateral lesions, 16 had predominantly right hemisphere lesions, and 2 had left hemisphere lesions (one a left hander). Hecaen and Angelergue (1963) conclude from these data that "The right hemisphere appears to play a special role in the appreciation of space and the recognition of faces (with) agnosia for objects being absent and troubles in color recognition very rare." (p. 132)

Neurological studies of patients with tumors are often contaminated by secondary symptoms. Operative removal for epileptic conditions, however, leave lesions with known boundaries. Consequently, research on such patients is helpful in the study of hemispheric specialization. Milner (1958) found patients with left temporal lobectomy experienced certain verbal difficulties, while patients with right temporal lobectomy were impaired in their perceptions of pictures. While these findings are qualified by changes in brain functioning resulting from long-standing epilepsy and head injuries, Milner and colleagues have carried out a program of research which constitutes an imposing body of evidence for right hemisphere specialization of "nonverbal" thought.⁷

Costa and Vaughn (1962) studied 54 persons, 18 with lesions in the left hemisphere, 18 with lesions in the right hemisphere, and 18 in a control group. The sample was standardized along other dimensions such as age and sex, severity of brain damage, and electroencephalographic measures. The investigators administered verbal and performance tests to the patients. The verbal instrument utilized was the Mill-Hill vocabulary test and the performance instrument was the WAIS Block Design Test (administered both with and without three times the usual time allotted). Results of the testing show that patients with right hemisphere lesions performed significantly better on the vocabulary test than did patients with left hemisphere lesions; conversely, patients with left hemisphere lesions did significantly better on the WAIS performance tests.

Hebb (1939) reported a case of a patient with a right temporal lobectomy. His loss of spatial reasoning was shown by inability to comprehend a situation rapidly, or to follow a conversation. He scored low on spatial tests, but above average on verbal tests. Bard and Brooks (1934) suggest that affirmative as well as negative evidence is required to infer localization of a function to a given area. That is, if the right hemisphere thinks visuospatially and nonverbally, then there should be: (1) loss of such functions with injury to the area--the negative evidence; and (2) preservation of such function when the specific related area is intact when extensive surrounding damage occurs--the affirmative evidence. Such a criterion is particularly relevant here. Denny-Brown and Baners, (1954) have pointed out that certain

visuospatial processes in the left hemisphere may incur damage which are difficult to demonstrate because of more important losses in propositional functioning.

Some such affirmative evidence for right hemisphere lateralization of visuospatial function was found by Mullan and Penfield (1959). From a corpus of 217 patients with temporal lobe epilepsy, 12 had visual illusions, arising in 11 cases from the hemisphere minor for handedness.

Additional affirmative evidence is presented in the next subsection, which considers right and left hemispheric verbal and visuospatial performances following disconnection of the corpus callosum.

Cerebral commissurotomy The two hemispheres of the brain are connected by the corpus callosum, the function of which is to transfer ideational and sensory-motor information from one hemisphere to the other. By such a "translation" procedure the corpus callosum makes possible the simultaneous use of verbal and visuospatial though (Bogen and Gazzaniga, 1965). A limited number of persons have literally had the "two brains" separated by disconnection of the callosum and anterior commissure at a single operation. In addition to diminishing the spread and severity of epileptic seizures,⁸ these "natural experiments" provide an opportunity for studying the independent functioning of the two hemispheres. It is then clear that the left side of the body is controlled by the right hemisphere, rather than being mediated via the corpus callosum, by the left hemisphere. The obverse is

also the case, the right side of the body being controlled by the left hemisphere. Thus, performances carried out by the right hand can be known to result from left hemisphere thought, and performances by the left hand by the right hemisphere.

In an extensive study of the first eight participants in this surgery, Bogen (1969a) found the patients experienced a reduced capability to write (dysgraphia) with the left hand but not with the right hand. Therefore, writing is not controlled by the right hemisphere, but is controlled by the left hemisphere. These patients also experienced a reduced capability to copy geometric figures (dysopia) with the right hand but not with the left. Therefore, the left hemisphere does not carry out this visuospatial reasoning and the right hemisphere does. Of course, as with other studies cited, dominance of propositional thought by the left hemisphere and dominance of appositional thought by the right hemisphere is a matter of degree.

All eight patients showed dysgraphia in the left hand and dysopia in the right hand (D-D). They varied considerably in their degree of incapacity, and also in the length of time the D-D phenomenon persisted. Factors such as lack of ipsilateral control and early brain damage were positively correlated with long periods of D-D.

It is also reported that while these patients could not copy geometric figures to a linear sequence of verbal instructions with their right hands, they were able to draw such figures to a linear sequence of verbal instructions.

Dysgraphia and Dyscopia after Hemispherectomy

The theory of hemispheric specialization leads to the expectation that after removal of the entire right hemisphere (right hemispherectomy) which paralyzes the left hand, the patient should be able to write but not copy with his right hand; and the obverse should occur after left hemispherectomy.

Experimental verification is available infrequently, as most patients undergoing this surgery have had defects in early life. However, there are a few cases of hemispherectomy to remove tumors that developed in adulthood. Bogen (1969a, pp.96-102) describes research on one patient with left hemispherectomy and one other with right hemispherectomy. The predicted results were obtained. Also, the right hemispherectomy patient was able to draw figures to verbal instructions.

Constructional Apraxia

Cerebral commissurotomy is followed by a period of apraxia for the left hand, i.e., the patient is unable to follow verbal instructions with the left hand (e.g. "Stick out your left little finger."). He can follow instructions with the right hand, and can carry out the act with his left if it is shown to him visually. Thus the left brain instructs the right hand through verbal thought, but not through visual thought. This apraxia subsided more rapidly than left-handed agraphia, but is based on a parallel inability of the right hemisphere to translate verbal comprehension into action. Such apraxia is not present in the right hand of the commissurotomy patients and hence they cannot be responsible for

right-handed dysgraphia. Further, when right-handed dyscopia is present, the right hand can still draw to verbal instructions. Right-hand dyscopia therefore cannot be considered an apraxia of the left hemisphere in following visuospatial instructions.

Kleist (cited in Critchley, 1966) defined the term constructional apraxia as a "disturbance in formative activities (arranging, building, drawing) and in which the spatial part of the task is missed, although there is no apraxia of single movements." (p.172) There is a body of evidence indicating right hemisphere damage is associated with construction apraxia. These studies have been reviewed by Zangwill (1961) and by Piercy (1964), who writes: "It is now clear that failure on construction tasks under visual control occurs more commonly and takes more severe form with right than with left hemisphere lesions..." Pierce, Hecaen, and de Ajuriaguerra (1960), in a review of 3000 cases, found 67 with construction apraxia: two-thirds of these had constructional apraxia resulting from right hemisphere lesions. These authors suggest constructional apraxia, resulting from right hemisphere lesions, is related to a defect in visuospatial conceptions, whereas constructional apraxia resulting from left hemisphere lesions is related to a more general motor apraxia. The view that constructional apraxia from a right hemisphere lesion is related to visuospatial agnosia was advanced by Ettlinger, Warrington, and Zangwill (1957). Warrington, James, and Kinsbourne (1966) investigated drawing disability and found that "A defect in incorporating spatial information into the drawing performance

characterizes the right-sided (that is, the right hemisphere) type of impairment." (p.81)

Constructional apraxia further explicates the structure of appositional thought: the appositional mode of thought is used in arranging objects, in building entities from objects, and in drawing. This certainly suggest the process of creative visuospatial constructions, such as art, derive from right-brained thought.

Music

Dide(1938) suggested the right hemisphere is superior for "kinesthetic" functions. Luria (1966a, p.90) considered the right hemisphere superior for music and for the awareness of a personal disability. Awareness of personal disability is appositional thought in the sense that it involves simultaneous evaluation of an entire system in relation to its environment. Certainly a mother's evaluation of the well-being of a child similarly involves appositional thought.

Survival of musical ability in spite of severe aphasia has been described by Dalin in 1745 (cited in Benton and Joynt, 1960). Even Henschen (1926), who discounted the importance of the right hemisphere reported that "In many cases of motor aphasia the faculty of singing words is conserved in spite of the inability to speak a single word. In such cases, the patient probably sings by means of the right hemisphere." (p. 520) Similar findings are reported by Critchley (1953, p.375) and Head (1963, pp. 409,520). Smith (1966) in fact reports that an adult patient who had a left hemispherectomy could barely speak but could sing a variety of

songs learned in early life.

Preservation of musical ability despite left hemisphere lesions is complemented by a loss of musical ability occurring with right hemisphere lesions which leave speech intact (Brain, 1965; Botez and Wertheim, 1959; Wertheim, 1963).

Kimura (1964) gave auditory tests--one consisting of spoken digits and the other of melodies--simultaneously in both ears. Since the ears are primarily contralateral in their connection to the brain, the hemispheric specialization theory leads to the expectation that digits will be comprehended better through the right ear and melodies better through the left ear. These outcomes were observed. Milner (1962) reported that scores on the Timbre and Tonal Memory subtests of the Seashore Measure of Musical Talent were depressed by right temporal lobectomy, but not by left temporal lobectomy.⁹

A study of epileptic patients by Kimura (1963) adds further evidence for right hemisphere specialization in appositional thought, and elaborates our view of this mode of reasoning. The subjects had seizures originating in the right or left temporal lobes. She hypothesized that the right temporal lobe is most involved in "rapid visual identification." A visual learning test was devised in which certain patterns were repeatedly presented to the subjects, interspersed with non-recurring designs. The right-side damaged respondents scored lower on recognition of recurring figures, due to their propensity to report non-recurring figures as recurring. Further, it was found that right hemisphere

damage impaired the perception of unfamiliar visual materials but not familiar materials. This suggests familiar materials can be represented by fewer neural units or in the effecience of those units. Hebb (1949, p. 293) suggested that in the initial establishment of a "cell assembly"--the neural correlate for a percept--more cells are necessary than for its functioning after the cell assembly is established. Thus, unfamiliar material is more sensitive to the loss of brain tissue than familiar. The Kimura findings indicate the right temporal lobe is more important than the left in establishing such cell assemblies. This outcome is coordinate with the data associating dysgraphia and constructional apraxia with the right hemispheric constructions of visuospatial perceptions.

Kimura also notes the familiar and unfamiliar tachistoscopic material differed in their degree of "verbal identificability" which is a concomitant of familiarity. Ability to associate a name to a configuration is an important step in development of concepts. She notes that studies of object agnosia after parieto-occipital damage suggest recognition of familiar objects may be more dependent on the left hemisphere than on the right. In many cases, alexia (word blindness, inability to read) can result from left hemisphere damage. Kimura concludes: "These facts suggest that as materials become more verbal, its perception depends more on the dominant hemisphere, since the final identification of the material is more intimately bound up with the center for speech." (p. 269) She adds that "this notion receives support from the fact that familiar objects ¹⁰ and alphabetical materials ¹¹ are

more accurately perceived in the right visual field than in the left; but geometric designs,¹² nonsense figures¹³, and groups of dots¹⁴ are not."

The Split Brain

Wigan's (1844) classic argument that the separate hemispheres each constitute a mind, implies that persons with two hemispheres have two minds. This conclusion has been partially tested by sectioning of the neocortical commissures, i.e. by "splitting the brain."

When the optic chiasm of a cat or monkey is divided sagittally, inputs from the right eye are connected only to the right hemisphere, and similarly the left eye informs only the left hemisphere. If an animal is trained to choose between two symbols using one eye, it can later choose with the other eye. But if the corpus callosum is severed from the beginning, learning does not transfer from one hemisphere to the other (Myers and Sperry, 1953, 1958; Myers, 1956; Sperry, 1961a, 1961b).

The second eye can be trained to choose the opposite member of the pair of symbols, so that the "correct" symbol choice depends on which eye is covered. In this way, the two hemispheres solve the problem in different ways and consequently function independently.

Subsequent experiments by Trevarthen (1962) concluded that the two hemispheres work not only independently but simultaneously. More recently, Gazzaniga and Young (1967) have shown that monkeys whose hemispheres have been disconnected, can solve independent

problems with each hand simultaneously, in contrast to unoperated monkeys who can barely do this. And Gazzaniga and Sperry (1966) have shown this phenomenon holds also for human patients who are split-brained. Thus these studies, in conjunction with the other data examined, support the view that man has two minds, which--after commissurotomy--can be regarded as two separate spheres of consciousness. Either hemisphere is sufficient to sustain a mind.

Lateralization and Hemispheric Specialization

The research described above indicates definitely that the locus for propositional thought is in the left hemisphere and the locus for appositional thought is in the right. Yet these data do not imply a genetic explanation. Zangwill (1964) in fact contends that in earliest infancy "...the two hemispheres are equipotential or nearly so with regard to the acquisition of speech." He adds that "Lateralization of speech begins early, almost certainly in the second year, and would appear to proceed pari passu with the acquisition of speech." (The hypothesis of an equally intricate appositional mode of thought advanced by Bogen suggest that, in this regard, the two hemispheres are equipotential.) As propositional thought becomes lateralized in the left hemisphere, the complementary mode of thought develops in the right. Therefore, when a patient undergoes left hemispherectomy, he is able to learn some language with his right brain; the capability to do this is dependent on age, and degree of lateralization (Smith and Burklund, 1966; Smith, 1966). Conversely, persons with massive right side ablations are able to attain some development of appositional

thought in the left hemisphere; again, capability depends on the extent of lateralization (Griffith and Davidson, 1966).

Psychological Manifestations of Propositionality and Appositionality

The foregoing indicates a clear differentiation of function of the left and right cerebral hemispheres. This neurological distinction would not necessarily exist at the psychological level. That is, while the evidence is clear that there are propositional and appositional modes of thought, it does not follow that there are propositional and appositional thinkers, persons specialized in one mode or the other. In this section evidence for the existence of such personality types, and physiological correlates, will be examined.

Day's (1967, 1968) research shows most persons, when asked questions such as "How much of the time do you think most people are happy" or "Who is your favorite composer?" will immediately look to the left or to the right. While the physiological mechanism of these conjugate lateral eye movements (CLEMs) is not entirely clear, it appears that left-movers primarily use the right hemisphere, whereas right-movers use the left hemisphere. When the left hemisphere oculomotor areas are stimulated, the eyes move right; when the right hemisphere's oculomotor areas are stimulated, the eyes move left. (Apart from the physical mechanism, a possible explanation, the reason for it, is that the hemisphere which "goes to work" in response to a question diverts the eyes to the visual field containing the most relevant information. Because of contralateral control of the eyes by the brain hemispheres, the

left eye disproportionately informs the right hemisphere, and vice versa. (It would be interesting to see if the right ear hears better following a question asked of a right looker.)

Day found that most persons consistently look either right or left. Further, he found differing personality organizations between right and left movers. Right-movers (propositional thinkers) scored high on reading ability tests and visual attention tests; left-movers were more responsive to music, more sensitive to sounds around them, and quicker to respond to a person's tone of voice or manner of speaking (all functions associated with the appositional mind).

Right movers used language in a concise, assertive, matter-of-fact style, i.e., a propositional style; left-movers were more given to flowery adjectives. (This distinction might be used to distinguish men of science and men of letters.)

Bakan's (1969) research on right and left movers suggest that right-movers are more apt to choose "hard" majors--mathematics, biology, engineering, economics, and physics; left-movers selected "soft" subjects--psychology, political science, English history,... 9 of 17 right-movers were in "hard" sciences, and 15 of 18 left-movers were in "soft" subjects. The right-movers did better on the mathematics subtest of the Scholastic Aptitude Test, and left-movers did better on the verbal. Further, left-movers were found more hypnotizable, to emit alpha- waves with greater frequency, and to report clear visual images (1971, p.68). In a later paper,

Bakan (1971) concludes: "Lateral eye movements, then, appear to indicate which hemisphere of the brain is relatively more dominant. In addition, there seem to be basic personality differences between right-movers and left-movers." (p.68)

Research by Smith (1964) indicates there may be basic personality differences between men of science and men of letters, and that these differences are manifested in facial expressions (Cf. Day). A sample of 81 students were asked to distinguish two groups of scholars according to portraits of eminent men of science and letters. The students were able to distinguish the two groups. Men of science were stereotyped as thin-faced, tight-lipped, with keen penetrating eyes, with hard, severe expressions, and to be cold in temperment. Literary men were seen as fat, full-lipped, possibly feminine, with soft expressive mouths and warm temperments (Smith, 1964, p.305). It is argued that these contrasts correspond to the standard schizothymes and cyclothymes (Kretschmer, 1931).

At any rate, there may be some reason for believing cerebral organization influences intellectual interests, personality organization, and even physical appearance. Bakan found right-movers to be active, and left-movers passive, which corresponds to the above description. Also, yang is the active, male principle; yin, the passive (receptive), female principle.

Smith's tight-lipped, full-lipped distinction could reflect a relative compulsiveness of scientists as opposed to literary men. Left hemisphere thinkers are undoubtedly more selective in the information they admit than are right hemisphere thinkers. In

fact, it is characteristic of the right hemisphere that it admits stimuli with minimal editing, hence its capability for simultaneous consideration of stimuli, and the construction of gestalts. Men of science have topics within them i.e., they possess (and retain) their ideas in a systematic manner. Men of letters, in contradistinction, are men within topics, and have a lesser sense of their intellectual achievements as personal possessions.

The cold, warm distinction may refer to the association of emotion with right hemisphere thinkers. There is clear physiological evidence that emotions are the property of neither hemisphere, as emotions are lower brain functions. But, as Diana TenHouten (personal communication) has suggested, a reason appositional thinkers may be stereotyped as emotional is that they entertain all sorts of stimuli, and in particular are apt to define emotions as data.¹⁵

The hard, soft distinction is also consistent with theories of propositionality and appositionality. In the yang-yin doctrine, yang is the firm and yin the yielding. A propositional thinker processes "harder" data, as his thinking involves abstraction and substruction, whereas the appositional thinker processes "softer" data, involving perception and construction.¹⁶

The above analysis, at a minimum, suggest the neurological specialization in left and right hemisphere thought may be correlated with genotypic manifestations--such as CLEMs, personal appearance, and personality structure. In the next chapter,

additional behaviorial characteristics of propositional thinkers and appositional thinkers will be mentioned. Further, the analysis will be shifted up again, to the social and cultural levels.

III. COGNITIVE STYLES AND SOCIETAL ORGANIZATION

Cognitive styles--propositional and appositional--can be used to characterize societies, strata of persons within societies, and categories of persons within strata. It is a principle of this research that modern technological societies tend toward propositionality, whereas traditional and "primitive" societies tend toward appositionality. This does not imply, however, that all modern societies tend to be propositionally oriented, nor that all non-modern societies are appositionally oriented. Further, there are innumerable spheres of societal organization according to which groups might be characterised by one cognitive mode. Analyses could be carried out in terms of technology, including mass communications and the mode of production, stereotyping of the right and left hands, language structure and use, the structure of educational systems, and so forth. In this chapter, bases for such societal descriptions will be briefly discussed. Then, hypotheses pertaining to allocations of components of propositional and appositional performances will be set forth.

Technology

The content of problems relevant for performance in the economic rules of a technological society are in large part linear and propositional. Production, for example, is character-

istically described as a linear process, e.g., consider the manufacture of an automobile. The structure of bureaucratic organization provides a second example of linear organization in modern society.

Whorf has suggested (1956, p.153) that Western objectification of time (which is propositional) "puts before the imagination something like a ribbon or scroll marked off into equal blank spaces, suggesting that each be filled with an entry... Through the interaction between language and the entire culture, modern society obtains: 1. Records, diaries, bookkeeping, accounting, mathematics stimulated by accounting; 2. Interest in exact sequence, dating, calendars, chronology, clocks, time as used in physics; 3. Annals, histories, interest in the past. In societies so oriented, the central organizing principles include: modernization, planning, efficiency, rationalization, and predictability."¹⁷

McLuhan (1964) describes linearization of thought and societal structures concurrent with the development of technology. He writes that prior to the invention of a phonetic alphabet, and a shift to linear information,

...man lived in an environment where all the senses were balanced and simultaneous, a closed world of tribal depth and resonance...The primary medium of communication was speech...which meant there was little individualism and specialization, the hallmark of 'civilized' Western man.

How, then, did such a dramatic shift from the simultaneous (appositional) to the sequential (linear) mode develop as man created an increasingly technocratic society? McLuhan (1962)

argues that the invention of the phonetic alphabet increased the importance of visual (as opposed to tactile and auditory) perceptions, and that the invention of the printing press in the 16th century accelerated this process.¹⁸ Literacy, McLuhan writes (1969), detribalized man, gave him an eye for an ear, and "...replaced his integral in-depth communication interplay with visually linear values and fragmented consciousness." (p.59) Additionally, literacy transformed thought "into uniform, connected and visual mode that we still consider the more of 'rational' existence...The alphabet shattered the charmed circle and resonating magic of the tribal world, exploding man into an agglomeration of specialized 'individuals'..." (p.59)

Thus the invention of writing, printing, and the spread of literacy meant the mode of thought that analyzes, orders, proves, and reasons through fragmentation rather than simultaneous consideration, came to be dominant. This means that as a concomitant of modernity, man's mode of thought shifted from the appositional to the propositional. Smith (1964), in fact, views ability to perceive detail as opposed to a whole as a fundamental difference between verbal and spatial thought.

McLuhan also argues that mass media have had a profound impact on modern society. Electric circuitry involves men with one another, and forces us to reconstruct information. He contends that the resulting "electronic all-configured world" has changed our habits from data classification to pattern recognition. Thus, "We can no longer build serially, block-

by-block, step-by-step, because instant communication insures that all factors of the environment and of experience co-exist in a state of active interplay." (McLuhan, 1967, p.63) This change from sequential classification to the simultaneous consideration of patterns creates a perceptual environment apprehended in the appositional mode.

Apart from sheer volume, the content of information is increasingly presented in mass media in an appositional mode--not visually and linearly, but simultaneously involving many senses. Television may be an important component of this new electric media. McLuhan states that (1969):

...the video image is one of low intensity or definition, unlike either photographs or film, offers no detailed information about specific objects but instead involves the active participation of the viewer. The TV image is a mosaic mesh not only of horizontal lines but of millions of tiny dots, of which the viewer is physiologically able to pick up only 50 or 60 from which he shapes the images; thus he is constantly filling in vague and blurry images, bringing himself into in-depth involvement...(p.61)

That the perception of a matrix of dots as a recognizable pattern is a right hemisphere function is supported by experimental research. Kimura's (1963) study of patients with left or right hemisphere damage, analyzes visual perceptions of poorly-defined, low-intensity, nonverbal images. The tests consisted of overlapping familiar figures, nonsense figures, and dots. A tachistoscope was employed in presenting the images. The performance measure for the first three tests was the number of stimuli correctly recognized; the dots test measured the number of dots recognized.

There were no significant differences in the two groups

for letter or overlapping familiar object recognition. But the right-side damaged group was found impaired in recognition of overlapping nonsense figures and dots. These outcomes constitute evidence that perception of poorly-defined shapes and dots, is a right hemisphere function. And since such performance involve the perceptual grasping of configurations, they can be described as appositional thought processes.

The above argument show the general propositional character of modern industrial society, and the possibility of reorientation toward greater involvement of the appositional mode. In particular, McLuhan's analysis traces the development of increasing propositionality as resulting from innovations in communications media. A difficulty with this conceptualization is the causative role assigned to media. It is this writer's view that the mode of production may be more central to the content of consciousness for members of society. This would be consistent, e.g., with a Marxist analysis of class consciousness deriving from changes in the mode of production, and ownership of the means of production. Thus, while McLuhan's work is employed as valuable description, it does not occupy a theoretical position here.

It is interesting to note that other arguments could be made for reorientation of societal-level shifts from propositionality to appositionality. Consider, e.g., the automobile. Automobile travel has brought people into closer contact with diverse life styles, and in this way may have contributed to

reductions of ethnocentrism and prejudice. Automobiles have also contributed to the development of neolocal residence patterns, a reduction of the social unit, and a fragmentation. Further, the automobile causes persons to spend less time alone, contributing to the development of a society of fragmented individuals. In such a social environment, however, the individual must be highly vigilant, which means he must simultaneously attend to a large number of stimuli, and to signs of danger. This is especially true of driving an automobile. Hence, this vigilance is a psychological manifestation of appositionality.¹⁹ In this way, as well as via media, the development of fragmenting technology may lead to appositionality; i.e. propositionality contains the seeds of its own appositionality.²⁰

Urban-Rural Differences

Cultural differences in cognitive modes can be found in urban and rural social environments. There are reasons to believe that rural societies are basically appositional. For they are dependent upon, and deal extensively with, the earth. Farming, for example, requires simultaneous attention be directed to varying stimuli--the atmosphere, the acidity, and wetness of the soil, and so forth. The viability of an agricultural enterprise is contingent upon decisions (e.g., when to plant) based on such perceptual processes.

It has been suggested that the Chinese doctrine of yang and yin bears structural parallels to the theory of appositional

and propositional thought. In this connection, it is interesting to note that identification of the appositional (yin) function with the earth existed in Chinese thought some six centuries B.C.: yin was identified with the yielding, the receptive, and the female principle; yang was identified with the firm, the creative, and the male principle. In the I Ching, or Book of Changes, the hexagram consisting entirely of yang lines is called the Creative, and is associated with Heaven (the abstract); the hexagram consisting of yin lines is called the Receptive, and is associated with the earth. (see Wilhelm, 1950)²¹ In almost all religious systems, the female principle is associated with the power of the earth, and the male principle with the power of the heavens (especially the Sun). For the American Indian (including the Hopi), Earth is the Mother and the Sun is the Father (Waters, 1963, p.29 passum).

Thus the theory predicts that modern urban societies should, in general, emphasise propositional function, and that rural societies should value appositional functions. For this reason, two samples of farmers are included in the survey for this study: white Midwestern farmers and Hopi Indians. With such data, it will be possible to make urban-rural comparisons between urban American society, rural American society, and Hopi society.

Cultural Valuing of the Left and Right Hands

Although no data on left and right handedness are described

above, contralateral control of the hands by the cerebral hemispheres suggests the right hand may be associated with propositional thought and the left hand may be associated with appositional thought. It should then be the case that attributes which are frequently criteria for subdominance, such as blackness and femininity, should be associated with the left hand. Such evidence is available in abundance from anthropological and sociological sources. For example, in describing Maori culture, Hertz (1906) writes:

Among the Maori the right is the sacred side, the seat of good and creative powers; the left is the profane side, possessing no virtue other than...certain disturbing and suspect powers. The same contrast reappears in the course of the evolution of religion, in more precise and less impersonal forms: the right is the side of the gods, where hovers the white figure of a good guardian angel; the left side is dedicated to demons, the devil; a black and wicked angel holds it in dominion. Even today...the right hand is still called good and beautiful and the left bad and ugly. (p. 100)

Hertz reports that the Maori even name the right side by a term designating man's masculine nature and the left side by a term designating man's feminine nature.

While the right side is considered sacred among the Maori and numerous other groups, the left hand, and the female element, are not viewed as lacking resources. Hertz (1907) writes:

...if a woman is powerless and passive in the religious order, she has her revenge in the domain of magic: she is particularly fitted for works of sorcery. "All evils, misery, and death," says a Maori proverb, "come from the female element." (p.97)

Just as the left hand is invidiously stereotyped, it is

in many contexts repressed. Jacobs (1892) reports an extreme case among inhabitants of the Netherlands Indies, in which children had their left arms bound to teach them not to use it. An intellectual rationale for such practices is described by Lombroso (1903).

More recently, research by Domhoff (1970) reviews similar research showing that the devaluation of the left hand by the Maori and Indo-European groups described by Hertz also apply to Hindus (Berkeley-Hill, 1921), American Mohave Indians (Devereux, 1951), American Chippewa Indians (Barnouw, 1963), and Arabs. Domhoff reports on data using semantic differentials for a number of the stereotypes of left and right reported in these studies, and found that a sample of American children, adolescents, and adults make similar distinctions.

The Maori and other societies may devalue the left hand because they fear the modes of thought associated with social phenomena which is the negation of their social orders (including the powers of magic and darkness). This does not answer the question of the "subversiveness" of the appositional function. If a society which is primarily appositional did not fear the appositional mind, but made an intensive practice of developing the resources of the right hemisphere, then one might expect the left hand would not be invidiously stereotyped. The Hopi constitute one such case: in an inquiry being carried out with Charles Kaplan, our informants indicated the right hand is associated with activity and aggression, and the left hand with

"intelligence". Since the Hopi are pacifists, they hardly value aggressiveness. Further, since they have a cultural and religious system which involves perceptual (and tacit) intelligence, i.e., "knowing" via the right hemisphere, it could be inferred that if either hand is invidiously stereotyped, it is the right.

There exist other considerations, however, which would lead to the expectation that--even in oppositionally oriented cultures--the oppositional function may appear in subdominant and "subversive" groups. If Barbara Williams view (see ff 17) that oppositionality is associated with vigilance and succoring at the psychological level is valid, then subdominant groups must necessarily be oppositional (Diana TenHouten, personal communication). Further, oppositional systems of knowledge that are incompatible with dominant religious and cultural practices may occur. For example, even among the Hopi an underworld of sorcery and magic exists.

Language Use and Language Structure²²

That language is an intricate part of how social reality comes to be determined is a well-established position within the social sciences (Whorf, Sapir, Chomsky, W.I. Thomas, Sacks). Therefore, a brief discussion of the relation of language to the theory of propositionality-oppositionality is in order. Most of this discussion should be read as suggestive. To be exhaustive it would require further research into the boundaries of the sample.

2

To begin, Bernstein (1966) has presented a distinction involving language codes. According to this theory, there exist two primary language codes: an elaborated code and a restricted code. An elaborated code displays the properties of exact grammar, large vocabulary, verbal completeness, few disjunctions, and the presence of fully developed propositions. Bernstein seems to have in mind the model of scientific, legal, etc., discourses that constitute the model of the "education man" in our society. In contradistinction, properties of restricted codes include small vocabulary, extra-verbal meanings, extensive use of gesture, emphasis, physical set, and facial expression. The verbal component of speech is elliptical and leaves much implicit.

The applicability of Bernstein's model is made possible under certain conditions. First, a distinction must be made between linguistic variation within a single given language and linguistic variation between two or more given languages. If we consider variation within a given language, let us say English, then Bernstein's terminology is most useful. Elaborated codes (which are propositional) would seem to appear most frequently with white males. Given that performance in speaking an elaborated code of English is an activity that is highly prized and rewarded in American society, it is also highly correlated with social dominance. That is, the most dominant group--white males--predictably would have more learning advantages, and would therefore have the ability to speak English in a fashion characterized by an elaborated code. On the other

hand restricted codes of English would be associated with social restrictions--we could expect to find restricted codes among restricted groups within the English-speaking society (for example, lower-class persons, blacks). Bernstein in fact, suggests that in closed communities (in which persons are maximally restricted), such as prisons, combat units, criminal subcultures, and peer group, restricted codes are extensively used. He also makes an argument that English lower-class persons employ restricted codes, whereas English middle- and upper-class persons use elaborated codes. Thus, if our connection of elaborated and restricted codes with propositionally and appositionally oriented speech, it follows that lower-class speech is higher in appositional information and lower in propositional information than middle- and upper-class speech. The implication for formal educational systems is obvious, and Bernstein makes the point: "What this code makes relevant to them, the learning generates by apparently spontaneous acts of speech, is not appropriate for formal educational experience. But only from this point of view is it not appropriate." (p.436)

This analysis could also be applied with less confidence to social classes in the United States. But it could be extended to a race comparison in the United States: black speech places more emphasis on metaphor, is more appositional, and approximates a restricted code; the speech used in the educational system of the U.S., on the other hand, approximates an elaborated code. Thus blacks can be expected to perform lower on propositional

verbal skills, and relatively higher on appositional verbal skills.

It is frequently assumed, by American Educators, that there exists a single language structure, and that children should be taught this language more or less uniformly. Such an assumption may not be empirically valid: the social experiences of children influence the way they use words, and the meanings which they attach to symbols used in communication (Barth, 1961; Houlier, 1954; Allport, 1955). On this, Mills (1939) writes that "Language, socially built and maintained, embodies implicit exhortations and social evaluations. A vocabulary is not merely a string of words: imminent within it are societal textures-- institutions and political coordinates." (p. 676)

Barth (1961) has hypothesized that American blacks and whites share the English language, but systematically impute different meanings to the same symbols. While there exists a large body of research contending that blacks are "culturally deprived" in their language development (Reiss, 1962; Passow, 1968; Johnson, 1967), these writers tend not to recognize the differing structures of black and white language. While black language may be restricted in its code, it is probably far richer in its nonverbal dimensions.

Grigsby (1970) has tested the hypothesis that among blacks and whites there exists differential usage of language. A questionnaire was developed to discriminate between black and white language patterns. For two independent samples, discriminant analyses indicated response patterns could be used to predict

race. In a sample of 28 black and 50 white high school and college students, only 9 were misclassified: 3 misclassified blacks were the only blacks in the sample who had spent a majority of their lives in a white setting; 6 misclassified whites were the only whites in the sample with sufficient contact with black culture to have become familiar with black language. A second sample of 20 white and 20 black social workers produced even greater discrimination. Grigsby writes that:

These black children are bringing to the school a set of experiences which is virtually inconceivable to the white teacher. Often the verbal patterns used by the students are offensive to the teacher...The fact is that the child may be using his language competence to present ideas in terms of the realities of the world that he, his peers, and his parents inhabit. This fact is often overlooked by the teacher who hears that the child has mispronounced a word, left out a verb, or failed to put a proper suffix on a word. The child is asked to conjugate words he has never spoken in that way before, and probably will never hear outside of the classroom. (p.159)

Black children thus do not develop propositional use of language as well as white children. They are less apt to learn formal grammar, standard verb conjugations, and other standardized structures. (At Howard University, for example, black college students are taught formal English as if it were a foreign language.) As formal language is the only acceptable means of communication in the educational system, blacks "fail" in school and are perceived as being unable to "compete". Further, black children do not learn to present their thoughts as a linear sequence of statements as their language is less

propositional and more appositional than is white language. Given this cognitive orientation, blacks who do perform at high levels are not apt to enter professions which emphasize propositional thought, such as mathematics, engineering, and so forth.

Grigsby points out another race difference in language use relevant to the propositional-appositional distinction. Words are more valuable in a spoken, as opposed to a written, context. Black youth are highly verbal, and attach great importance in being competent at "playing the dozens" and "signifying". (p.160) He cites Brown (1969) to this effect:

The street is where young bloods get their education. I learned how to talk in the streets, not from reading about Dick and Jane going to the zoo and all that simple shit. The teacher would test our vocabulary each week, but we knew the vocabulary we needed. They'd give us arithmetic to exercise our minds. Hell, we exercised our minds by playing the dozens. (pp. 25,26)

Thus, within the English language as spoken in the United States, Bernstein's distinction between elaborated and restricted codes, or usages, is related to white propositionality and black appositionality.

It is possible, however, to find a highly elaborated code in a highly appositional language. When we elaborate the analysis to that of variations between languages, this becomes a reality. In our particular research, this was manifested in the comparison of Hopi and English, as both have instances of high elaboration. Thus, Bernstein's restricted code would seem to apply not primarily to the analysis of dominance and

subdominance within a single language. Appositional language orientation of subdominant groups in American society means not that they speak appositional language; rather, they must make their restricted codes a communicable reality, via nonverbal enhancement.

The heart of the theory being explicated here is that both propositional and appositional modes of thought are cognitions involving distinctive strategies for solving similar problems; both are "intelligences" in and of themselves. The relation between the two modes is not one of lower cognitive function to higher, but rather one of coordination--i.e., the propositional mode is functional in certain conditions, and the appositional mode functional in others; and in yet other instances both are necessary.

This feature of propositionality and appositionality can be made very apparent when one undergoes a comparative analysis of variations between languages. It becomes even more evident if the languages under consideration are structurally as different as are English and Hopi. Both constitute highly articulated systems, each of which--depending on the speaker--are examples of Bernstein's elaborated code. Whorf, an investigator into both of these languages, was able to find radically different patterns in the structures of the languages. His findings indeed support predicted propositional and appositional performances in the English- and Hopi- speaking samples. In urban Los Angeles, we are dealing with a highly propositional society,

while Hopi society is highly appositional. If this bears out, we might assume that it would be reflected in basic structural differences between the two languages. The discussion will now draw on Whorf and on our own observations. Whorf notes:

In the earlier stages of work on the Hopi language, I had the pleasant feeling of being in familiar linguistic territory...But in the course of time it was not at all such clear sailing. The sentences I made up and submitted to my Hopi informant were usually wrong. At first the language seemed irregular. Later, I found it quite regular in terms of its own patterns.

While most Hopi speak excellent English, they are able to translate from English to Hopi only with the greatest difficulty. The regularity Whorf discovered in the Hopi language can be explicated in terms of the theory presented here: The difficulty that an English-speaking student of Hopi encounters is that of translating a highly elaborated appositional linguistic structure into one that is highly propositional. To explore this statement we will offer a few variations between the languages that pertain to the two cognitive modes.

In order to come to grips with the Hopi language, Whorf had to develop a new linguistic category he termed a cryptotype. This he set in contrast to the familiar linguistic category phenotype. He found that the Hopi language abounds with these cryptotypes, while they are almost entirely absent in English on the formal level. English instead abounds with phenotypes. A cryptotype is defined as a unit of meaning having to do with a facet below, or nearly below, the threshold of conscious thinking that it cannot be defined by the speaker with other words and

as such often eludes translation (Whorf, p.105). In essence, a cryptotype has no formal meaning, but rather a meaning submerged and shown as an influence. In contrast a phenotype has a formal mark and a clearly determined class position. A cryptotype should not be confused with Bernstein's concept of a restricted code, in that a cryptotype has articulated elements on the verbal level and does not rely on facial expression, gesture, and the like. In fact, Hopi speakers almost never move their hands when they speak. Whorf states:

In many languages the cryptotype concept would be of little use, but there are languages like Hopi in which much of the influential material of paradigm production lies in this heavily veiled state, just as there are people whose mental life is much less accessible than that of others. (p.110)

Whorf found that the motivations involved in using cryptotypes was derived from an attempt not to spoil or falsify the deep cognitive processes involved in the perception of certain phenomena. In a definite sense the Hopi language is geared not so much in the construction of propositions and engaging in dialectics but rather as an instrument of vigilance on the multiplicity of nature. This becomes dramatically evident in Whorf's finding:

The Hopi actually have a language better equipped to deal with such vibrational phenomena than is our latest scientific terminology. This is simply because their language establishes a general contrast between two types of experience, which corresponds to a contrast that, as our science has discovered, is all-pervading and fundamental in nature. According to the conception of modern physics, the contrast of particle and field of vibrations is more fundamental in the world of nature than such con-

trasts as space and time, or past, present, and future, which are the sorts of contrasts that our language imposes upon us. The Hopi aspect-contrast, which we have observed, being obligatory upon the verb forms, practically forces the Hopi to notice and observe vibratory phenomena, and furthermore encourages them to find names for and to classify such phenomena. As a matter-of-fact, the language is extraordinarily rich in terms for vibratory phenomena and for the punctual events to which they are related. (pp. 55-56)

Out of the above emerges two fundamental distinctions between English and Hopi, that are closely related to the concepts propositional and appositional:

1. Nature of language: English speaking persons see language as a means of expression, a vehicle for argumentation, and a pre-eminently social phenomenon; the Hopi see language as a means of observation, a vehicle for the discovery of ever-emerging levels of vibrations, and pre-eminently natural phenomenon. (In this sense, English is conceptual and Hopi perceptual, which parallels the propositional-appositional distinction.

2. Grammatical structure: The English language has a proclivity for nouns and objectifications. Time, for instance, is conceived of as the flow of objects (days) through an objectified medium consisting of past-present-future. The Hopi language has a proclivity for events; there are no notions of abstract or objectified time. What is more important for the ordering of events are "invisible intensity factors", (Whorf, p.147), which determine the duration and stability of events. Events become "later and later" but not all in the same way; there is no uniformity-in-objective-time, but rather a dur-

ation in which each particular existent is able to manifest as a whole in its own unique mode of duration.²¹

Educational Institutions

The process of learning to perform economic tasks, of becoming "qualified" to do so, requires performance in an educational system oriented to propositional thought. At every level, the educational system promotes, through a sequence of grades, such basic decisions being based on a student's capability for problem-solving which employs propositional reasoning, and the production of outputs organized in this mode.

Smith (1964) has argued that the English educational system over-emphasises propositional thought (in his terminology, verbal performance as opposed to spatial performance). He also notes that the tendency of psychologists to equate verbal tests as synonymous with IQ has systemtically resulted in restriction of opportunity for students who could meet needs for scientists, mathematicians, and other highly trained workers. His arguments could be applied to the American educational system as well. It too disproportionately rewards verbal performance.

This reality, as one might expect, poses difficulties for those students whose cultural background or personal preference make them appositional thinkers. On this, Jensen (1969a) writes:

...many children today are confronted in our schools with an educational philosophy and methodology which were mainly shaped in the past, entirely without any roots in the child's genetic or cultural heritage...if a child cannot show that he "understands" the meaning of $1 + 1 = 2$ in some abstract, verbal, cognitive sense,

he is in effect not allowed to go on to learn $2 + 2 = 4$. I am reasonably convinced that all basic scholastic skills can be learned by children with normal Level I learning ability, provided the instructional techniques do not make g (Level II) the sine qua non of being able to learn. (p.117)

While the identification of g (general intelligence) with Level II learning may be questionable, Jensen has made a valid point. The educational system in the United States is geared to define only propositional thought as "intelligence" and to define propositional reasoning as the only learning mode. Jensen thus identifies, and uses, a cultural bias that discriminates against appositional thinkers.

It should also be kept in mind, however, that in referring to "Level I" thought, Jensen does not refer to appositional thought as described in this paper. He includes performances such as rote learning and memorization in operationally defining Level I thought. Certainly an emphasis on appositional thought defined in this way would be disastrous for the educational system, and would further stultify groups already oppressed in the schools.

In the educational system, balance between instruction in the propositional and appositional modes would entail reduced emphases on reading as a medium of information transfer, on quantitative evaluation (grades), and on linear advancement from grade to grade. These changes are of course much in progress, and may be fundamental to tensions in educational systems: students increasingly do not respond to linear pro-

grams of instruction, insisting instead on currently relevant information, i.e., incorporation of...events within their original nonlinear order." (Cf. Lee, 1950, in a description of the Trobriand mind.) In this connection, it may be noted that books too increasingly are multi-media productions, using abstract or concrete visual imagery to complement words.

IV. PRINCIPAL COMPONENTS OF THE CEREBRAL DUALITY

In the last chapter it was argued that the distribution of propositionality and appositionality within a society reflects social dominance and subdominance. In particular, it is predicted that in urban American society, which is primarily propositional, white persons will be relatively propositional in comparison to blacks. It is not clear, however, that within-race sex-differences will show the same result, so that the subdominant female groups would be relatively less propositional than males. These doubts arise both from empirical studies and theoretical considerations.

On the empirical level, there exists some data showing females do better on verbal and not as well on spatial tests (See, e.g., Smith, 1964, p.122, 209). Other studies show no differences in the ability structures of the sexes (Kerstone, A World Health Organization, cited in Friendly, 1971, p.22G). Bakan (1971) reports that there are no sex differences in the percentages of males and females that are right-lookers and left-lookers, but that females are more apt to show no consistent pattern. This suggests there may be no differences: for it is highly unlikely that the female tendency to look both ways results from a random process, and that there may indeed be sex differences at some higher levels of analysis. In summary, there is no consensus on any directional difference in pro-

positional and appositionality according to sex, and it is probable that sex differences which do exist derive from social forces.

It is the purpose of this chapter to explicate a theory about within-race sex differences. This explanation potentially explains why there may be no difference in the relative proportionality of sexes, but that other differences may indeed exist. Further, this theory accounts for Bakan's finding of inconsistent eye movements in females.

Guttman's (1954) theory of the principal components of scalable attitudes indicates that scalable attitudes have an infinity of principal components (eigenvalues), and that direction is only the first component. To summarize this theory, it is necessary to define the concepts scale and principal component.

A scale can be described as follows. Suppose an investigator wished to measure some single variable which contains an underlying metric, under the constraint that he can only ask questions to which the respondent agrees or disagrees. For example, suppose the variable under consideration is weight. Clearly, weight has an underlying metric (e.g., inches), and it clearly constitutes a single variable. Now there exists a hypothetical universe of questions. Suppose the universe of questions is: "Do you weigh more than k pounds?" where k is a positive real number. From this universe of content, the investigator might select three:

Item 1: Do you weigh more than 100 pounds?

Item 2: Do you weigh more than 150 pounds?

Item 3: Do you weigh more than 175 pounds?

If accurate answers are obtained, everyone agreeing with item 3 should agree with items 1, and 2, and everyone agreeing with item 2 should agree with item 1. In fact, the items should form one of four perfect scale patterns for every respondent:

	Item			Weight
	1	2	3	
Pattern A	yes	yes	yes	Over 175 pounds
Pattern B	yes	yes	no	150 through 175 pounds
Pattern C	yes	no	no	100 through 150 pounds
Pattern D	no	no	no	Less than 100 pounds

Such a pattern, in which all "Yes" answers are to the left of all "No" answers, satisfies the definition of a scale. Obviously, we would not weigh a person's weight by such a procedure, but if our universe of content is "Work alienation", there may be no alternative.

Such scaling procedures perform two functions. First, a statistical decision can be made regarding the existence of a single variable as the universe of content for the items. Second, if it is decided such a universe exists, on the basis that the data correspond to the model of a scale, then each respondent can be measured. If a favorable decision is reached, the measurement of non-perfect scale types becomes a deep question, but

this need not concern us here. (A method exists for determining the proportion of residual variance in response patterns is explained by the model of a scale (as a covariate), excluding the effects of items and groups of respondents (See TenHouten, 1971)).

In this investigation, the two hemispheres function somewhat independently, so a person can be high on both left hemisphere performance and right hemisphere performance. The variable relative proportionality, however, can be defined as follows: $(\text{propositional score} - \text{appositional score}) / (\text{propositional score} + \text{appositional score})$. This can be regarded as a single variable, which ranges from -1 to +1.

Principal components of scales refer to the properties of the underlying metric (beyond mere rank ordering) in a scale. The criterion for stretching and squeezing the various differences between ranks of persons is maximizing the internal consistency in the sense of least squares. For perfect scales, there always is a best solution or metric (See Guttman, 1941), which bears a monotonic relationship to the ranks. After this best solution, there is a second best solution, and so on. It is known that the second best solution has a U-shaped relationship to the percentile metric; i.e., persons with very low or very high ranks have the highest scores for solution two. The third solution has two bends in the curve, when viewed as a function of the percentile metric. And each additional solution has one more bend in it (Guttman, 1954, pp.226-227).

Further, the first four components have been given a substantive interpretations for attitude scales. The first solution (or principle component) is the direction of the attitude, the second is the intensity of the attitude, the third is the closure for the attitude, and the fourth is involution, the extent to which the respondent turns the attitude over in his mind.

This methodology is a theory about the structure of order, about the meaning of right and left. Hence, it might be possible to connect it to the substantive theory developed here. Such connectivity requires an additional substantive argument.

In a context of urban American society, race differences in a sense precede sex differences. That is, it is more meaningful to talk about sex differences within races than race differences within sexes. For race is a more powerful ascriptive criterion for subdominance. Race is such a powerful variable that it literally separates persons. For example, if a random sample of American citizens were placed in a room or house, the blacks and whites would quickly become physically segregated. Within both race groups, there would occur further separation by sex. Such a chain of events, with the roles of race and sex reversed, seems empirically most improbable.²³

The theory states that blacks are more appositional than are whites. In this sense, we say there exists directional difference, with whites performing primarily within their left

hemispheres and blacks within their right hemispheres. The direction of the cognitive mode, however, is only the first component of the cerebral dualism. The second component of any ordered structure is intensity (Here, specialization would be an appropriate term.). Since women are subdominant within races, it is hypothesised that women should be more specialized than men. That is, the first level of subdominance produces a difference in the first component of cognition--relative propositionality; the second level of subdominance produces a difference in the second component of cognition--specialization.

Given, these results, an argument can be made regarding sex differences in the third component--closure. A person's metric score is an additive function of the principle components. Each component explains less variance in the person's score than does the previous component. If we assume most of the variance in cognitive organization is accounted for by the first three components, the following can be deduced: since sexes do not differ in the direction of relative propositionality, and females are hypothesised to be more intensely propositional or appositional, it follows that males should have a higher level of closure. That is, they should be more consistent with respect to which hemisphere they use. For example, high closure would mean a person uses one hemisphere for nearly all problems; low closure, that a person would use one hemisphere for certain problems and the other for certain other problems. Low closure

could also mean using the two hemispheres at different stages of solving a problem. For example, the questions "Who is your favorite composer?" and "What is the square root of 121?" might elicit two right looks from a man, and a left and a right look, respectively, from a woman. Or, a female might be more apt to look one way in the early stages of analysis of the question, and then the other way. I have observed a number of female scholars who, when asked a question of interest, exhibit an extreme left move, and then show right moves. This pattern shows a high intensity of eye movements (the second component) and low closure (eye movements in each direction). This accounts for Bakan's finding that women are less consistent in their conjugate lateral eye movements than are men.

In the survey analysis to follow, hypotheses pertaining to the first two components will be carried out for the urban adult sample, the only sample sufficiently large to permit such an inquiry. Thus, we have reached the transition point from theory to the analysis of data designed to provide a preliminary evaluation of the external validity of the theory. In the next chapter the study will be described, and the actual analysis begins in Chapter VI.

V. THE SURVEYS: SAMPLES AND INSTRUMENTS

The surveys are intended to provide extensive information on the distribution of propositional and appositional thinking--in terms of performances, values and preferences, and uses. To this end the research design specified sampling in a variety of cultural, economic, and social contexts. Through such a design, it became possible to study cognitive styles by a comparative method. The following samples were obtained:

Urban adult occupational sample

390 blacks
568 whites

Urban adult residential sample

145 blacks
113 whites

Urban children school sample

95 blacks
80 whites

Rural adult residential sample

54 white males
27 white females

Hopi adult residential sample

26 males
23 females

(continued)

Hopi children school sample

46 males
50 females

This design can be displayed as a chart, where the control variables are white-nonwhite (black, Hopi), urban-rural, and adult-child.

	Urban		Rural	
	Adult	Child	Adult	Child
White.....	681	80	81	0
Nonwhite...	535	95	49	96

In all, the samples contain 742 whites, 630 blacks, and 145 Hopi; the sample size for the entire study is 1,517.

The Urban Samples

The urban samples were all carried out in Los Angeles County, California. While a single county bounds the sampling frame, this county is enormous, and sampling was carried out in a diversity of communities having a wide range of life styles and governmental structures. (As of 1971, there are 77 separate cities within the County, and some 7 million inhabitants.)

Race and sex are primary comparison variables for the urban samples. The obtained adult samples, occupational and residential, contained 287 black females, 245 black males, 307 white females, and 374 white males.

In addition to race and sex, cognitive mode (appositional, propositional) needed to be considered in the sampling design. Here two objectives guided the methodology. First, the distribution of appositional and propositional thinkers in the different race-sex groups is a basic research question for the study. To facilitate such a comparison, a block cluster sample of black and white residences was carried out.

Second, a sample was drawn which explicitly looks for persons apt to be relatively specialized in one mode. Since the measurement of the respondent's primary cognitive mode derives from the interview, prior measurement of individuals as appositional or propositional is not possible. What was done was to sample individuals in occupational categories for which the primary cognitive mode could, albeit crudely, be anticipated on some a priori basis. For example, since music is known to be a right hemisphere activity, it should be the case that a sample of musicians should tend to be predominantly appositional; a sample of mathematicians, in contrast, should tend to be propositional.

Thus, coding of occupational categories should facilitate the study of cognitive specialization in the two modes. There is, in fact, some evidence that occupational choice does derive from cognitive mode. One bit of indirect evidence derives from the Minnesota Studies in Student Personnel Work (Layton, 1960). These analyses of the Strong Vocational Interest Blank indicate

occupational choice is strongly influenced by cognitive style. More directly, Bakan (1971, p.66) reports that persons who are "right lookers" are high scorers on quantitative aptitude tests and are likely to major in science and quantitative areas; "left lookers", in contradistinction, are more apt to choose classics and the humanities. Since choice of a major is highly correlated with subsequent occupational choice, it follows that propositional thinkers are apt to be concentrated in occupations involving quantitative thought, whereas appositional thinkers should be concentrated in occupations involving non-quantitative thought. Thus, the cognitive mode associated with the content of an occupation provides a vehicle for looking for appositional and propositional thinkers.

Of course, considerable variations between persons within any occupation are to be expected. And, in addition, for any individual within an occupation, changes in emphasis can occur over time. An illustration is provided by the painter Raoul Dufy, who had a highly "linear" Fauvist style, and whose work scrupulously respected Euclidian perspective, scale, and logical order. To overcome these propositional constraints, Dufy began painting with his left hand. As a result, his painting became less linear and less confined to scale, perspective, and the conjunction of color and object. (Clay, 1971) Interdependencies between the two modes in occupational settings are described by Smith (1964) and Polangi (1966).

A further limitation of a priori classification of occupations is that a majority of occupations are not sharply distinguishable by this criterion. To overcome this problem, a decision was made to sample disproportionately among occupations which could be reliably coded as propositional or appositional. This coding of the occupations listed in the U.S. Census Bureau categories has both a cost and a payoff. The cost involves a reduced capacity to generalize to some finite sampling frame. The payoff is an enhanced capability to test the theory, i.e., to generalize to some hypothetical universe specified by the coordinating definitions of the theory.

The occupational sample will be described first, and the further controls over the variables age and socioeconomic status (SES) described. Then the structure of the smaller residential and children's samples will be explained.

The Urban Adult Occupational Sample

Since whites have higher SES levels than do blacks, it was decided to introduce explicit statistical control over this variable. It was decided that--while a uniform distribution of SES levels within each race-sex group would not be economically feasible--equal numbers of black and white respondents should be obtained within general SES levels.

This sample was constructed with the aid of lists of occupations coded as "appositional," "propositional", or "not classifiable". A selective list of occupations coded for the

the two modes, by SES level, is shown in Table 1. The complete list of occupations categorized on an a priori basis are shown in Table 2A. (In the text, tables whose numbers are followed by "A" are found in Appendix A.) These listed occupations do not exhaust the possible types of jobs that could be so coded. It should be emphasized that the usefulness of the sampling design does not depend upon these a priori assignments being free of error. The purpose of the procedure is to find appositional and propositional thinkers, so that the topic of the investigation can be studied empirically, i.e., so the theory can be tested.

Sampling in organizations. To obtain a sample of persons in occupational categories, firms and organizations were selected on a purposive basis. There was no one-to-one correspondence between organizations and occupations; members of the same occupation were sampled in more than one organization, and members of numerous occupations were sampled within certain firms and organizations.

A possible source of bias was introduced through a procedure of using interviewers to select organizations for which they could obtain access to certain occupations. Since persons are apt to seek out for conversation, or for interviewing, others who are similar to themselves, the criteria for selecting interviewers could influence the structure of the sample. With this problem in mind, an effort was made to select a broad

Table 1

Selected Occupations Defined, A Priori,
as Appositional or Propositional, by
Socioeconomic Level: Urban
Occupational Sample

Socioeconomic Status	Occupational Classification	
	<u>Appositional</u>	<u>Propositional</u>
90-99 (high)	Architects Poets Designers	Scientists Engineers Doctors
80-89	Actors, Actresses Film Producers Artists	Math Teachers Secretaries Technicians
70-79	Photographers Musicians Song Writers	Electricians Nurses Bookkeepers
60-69	Decorators Clergymen General Craftsmen	Machinists Plumbers Keypunch Operators
59 or less (low)	Models Hairdressers Cooks	Auto Mechanics Masons Warehousemen

range of black and white interviewers. A staff of 50 black and 25 white interviewers were trained and used of the study. Age. It was not feasible to exert explicit control over the age distributions of the occupational sample. But within each race-sex group, and in the adult sampling in general, an effort was made to include persons of various ages. In some organizations, there was limited variability in the age distribution of the occupational categories of interest, and control over the variable age was therefore not possible. But in many cases workers in an occupational category to be sampled varied considerable by age. In such cases, interviewers were given a standard instruction to obtain a sample one-third 18-30 years of age, one-third 30-49, and one-third 50 and older. By this procedure, a sample was obtained with a wide distribution of ages in each race-sex group, for each of the five SES levels (See Table 3A).

A picture of the SES levels of the race-sex groups is shown in Table 4. The four groups do differ somewhat by SES level, the white having higher statuses than do the blacks. For example, the percentages with SES of 80 or more are black females 30, black males 23, white females 48, and white males 49.

Table 5 shows the percentages of respondents in this sample classified, a priori, as incumbents of appositional, propositional, or non-classifiable jobs. The objective of controlling for the

Table 4

Percentages of Respondents in Each
of Five Occupational Status Levels,
by Race and Sex: Urban Adult
Occupational Sample

Socioeconomic Status	Black Female	Black Male	White Female	White Male	Total
90-99 (high)	6	9	15	23	15
80-89	30	17	38	29	29
70-79	27	21	23	17	22
60-69	13	23	12	11	14
59 or Less (low)	24	30	12	20	20
Total Percent	100	100	100	100	100
Number	194	187	249	316	946

Table 5

Percentages of Respondents Defined,
A Priori, as Appositional,
Propositional, or Not Classifiable:
Urban Adult Occupational Sample

Classification	Black Female	Black Male	White Female	White Male	Total
Appositional	22	28	35	31	30
Propositional	50	51	44	48	48
Not Classifiable	28	21	21	21	22
Total Percent	100	100	100	100	100
Number	(190)	(181)	(181)	(311)	(929)

cognitive style was attained, as the differences in the distributions between the four race-sex groups are small. In fact, the outcome is conservative with respect to the theory being tested in that blacks are more frequently sampled from proportional jobs than are whites: these race differences, 6 percent for females and 3 percent for males, however, are small.

The Urban Adult Residential Sample

Since analysis of the theory has been given higher priority than generalization to some finite sampling frame, a higher investment was made in the occupational sample than to the residential sample.

The adult urban residential sample was stratified by the variables area, race, sex, and age distribution. Socioeconomic status is controlled only indirectly, through sampling lower-class and middle-class black and white areas.

Area. The black samples were drawn in three areas of Los Angeles: 78 interviews in Watts (lower-class), 57 interviews in Crenshaw (middle-class), and 10 interviews in Venice (lower-class). A total of 145 black interviews were obtained. In each area, sampling was carried out only in subsections scored high on percent black in the 1960 U.S. Census Bureau data. The white samples were drawn in four areas: 40 interviews in a "straight" lower-class area of Santa Monica; 40 interviews in a "hip" area of Laurel Canyon (one 10-interview assignment in a

lower status area, one 10-interview assignment in a higher status area); and 13 interviews in a "hip" area of Venice. The white sample was 113.

Race. The black and white samples were gathered separately, with the race of the interviewer matching that of the respondent. Mexican-Americans (Chicanos) were excluded from the white samples. (Persons were defined as Mexican-American if they had "Spanish surnames", or if they were otherwise identifiable as Mexican-American.) Other non-white groups, such as American Indian, Orientals, and so forth, were not interviewed.

Sex and age. These two variables were simultaneously controlled by the requirements of 10-person interviewer assignments. For both black and white samples, an assignment had the following characteristics:

	18-29	30-49	Age 50 or older	Total
Male	2	1	1	4
Female	3	2	1	6
<u>Total</u>	<u>5</u>	<u>3</u>	<u>2</u>	<u>10</u>

The disproportionate sampling of younger persons in the residential samples was to compensate for the disproportionately older samples that were apt to be generated through occupational sampling. In certain cases, there was such limited variability by age, that this design was not realized.

The sampling method. A standard technique of block cluster sampling was used for the adult residential sample. For each 10-person assignment, the interviewer was given a number of

blocks in a specified area, and instructed to sample systematically (every third housing unit, after a random start) until he or she had located and interviewed ten persons with the desired sex-age characteristics.²⁴

The sample. Since blacks are underrepresented in firms and organizations (38 percent of the adult occupational sample is black), it was costly to locate and interview blacks in the occupational sample. In residential areas, however, it is not more difficult to locate and interview black people. The residential sample was designed to partially restore this racial imbalance. The residential sample size ended up at 258, 145 black and 113 white; this sample is 56 percent black. The combined occupational and residential adult samples are 44 percent black.

It was also more difficult to obtain female interviews in the occupational setting. Also, females are more economically located through block cluster sampling than are males. With these considerations in mind, a sample of 57 percent female was obtained for the black and white residential samples.

As mentioned, individual SES was not subjected to explicit statistical control in the sampling design. A look at the residential sample by race-sex group and SES level is provided by Table 6. These data show the indirect control of SES through sampling lower-class and middle-class neighborhoods for both blacks and whites was not sufficient to remove SES level differences. Blacks have considerably lower status than do whites.

Table 6

Percentages of Respondents in Each
of Five Occupational Status Levels,
by Race and Sex: Urban
Adult Residential Sample

Socioeconomic Status	Black Female	Black Male	White Female	White Male	Total
90-99 (high)	3	7	4	14	7
80-89	16	6	22	20	15
70-79	11	9	22	27	17
60-69	17	22	14	12	17
59 or Less (low)	53	56	38	27	44
Total Percent	100	100	100	100	100
Number	(89)	(54)	(55)	(56)	(254)

For example, the percentages with SES of 70 or more are black females 30, black males 22, white females 46, and white males 61. There are only small sex differences within race groups.

In the data analysis of the Los Angeles samples, the occupational and residential interviews can be combined. Table 7 shows the combined distribution of the four race-sex groups by SES levels. This table shows a race difference, but negligible within-race sex differences. The percentages of respondents with SES of 80 or more are black females 30, black males 23, white females 48, and white males 49. The percentages in the 70-79 SES category are nearly uniform, so the distribution of percentages in the lower two categories complement those of the top two. The distributions obtained are variable enough to permit explicit control of the variable SES in data analysis.

Table 8A shows the percentages of respondents in oppositional, propositional and non-classifiable jobs. Table 9A shows the percentages of respondents in varying SES levels, by occupational classification and race-sex group.

The Urban Children's Sample

A sample of 175 Los Angeles elementary school children was obtained. A modified instrument was administered to 80 white and 95 black children in grades 4-6. The variable age was stratified from 8-12 years (one 6th grader was 13). The 8-year minimum was necessary, for interpretation of a subset of the Wechsler Child Vocabulary Test and the Wechsler Child Similarities Test.

Table 7

Percentages of Respondents in Each of
Five Occupational Status Levels, by
Race and Sex: Combined Urban Adult
Occupational and Residential Samples

Socioeconomic Status	Black Female	Black Male	White Female	White Male	Total
90-99 (high)	5	9	13	22	5
80-89	25	14	35	27	25
70-79	22	19	22	19	22
60-69	15	23	13	11	15
59 or Less (low)	33	35	17	21	33
Total Percent	100	100	100	100	100
Number	(283)	(241)	(304)	(372)	(1200)

An attempt to obtain variability in family socioeconomic status was made by sampling children in multiple settings. Black children were interviewed in a Watts elementary school (lower-class), in the Pacoima area of the San Fernando Valley (lower-class), and in West Los Angeles (middle-class). White children were interviewed in West Los Angeles (in a non-graded school drawing students from all areas of greater Los Angeles), and in a middle-class suburb of the San Fernando Valley.

Interviews were conducted in school settings and at home. Teachers were not present during the interviewing. They were administered in groups of 2 or 3 children, with each child writing answers on the interview schedule. The interviewers assisted on open-end questions and on the items requiring detailed vocabulary usage. For children lacking reading or writing skills, the interviewer recorded as answers were given orally.

This sample, and the Hopi children's sample, are not reported on here.

The Rural Adult Sample.

Calhoun County, Michigan was chosen as the sampling frame for this sample. A list of full-time farmers was obtained from the County Agent's Farm Directory. This list contained the names of 100 full-time farmers not otherwise employed.

Interviews were carried out by two indigenous (female) interviewers. Some attrition from the initial frame was created

through death, migration, and farmers involvement in other work (e.e.g, factory job). An effort was made to sample exhaustively: this effort created a sample of 54 farmers (usually one to a farm, but brothers sharing a farm were both interviewed.) There were no refusals, but certain farmers were out-of-town for the winter, some not farming full-time, and others were not locatable. Additionally, a random sample of 27 farmers wives were interviewed.

The Hopi Adult Sample.

The Hopi adult sample members were given a short form of the questionnaire, consisting of the Street Gestalt Completion Test, the WAIS Similarities Test, and questions asking their educational level, age, and mesa.

The villages in the Hopi reservation are located on or near three mesas. Since there are some dialectical, kinship, clan, and historical variations, samples were drawn from all three mesas. A total of 49 interviews were obtained, 18 from First Mesa, 16 from Second Mesa, and 15 from Third Mesa.

A subset of villages were selected for each mesa, and a systematic sample of households selected within the villages. As many interviews as appropriate were than obtained within each household. All interviewing was done by a male Hopi.

The sample was evenly divided by sex and age; 26 respondents were male, 22 female; 18 respondents were between 16-30 years of age, 13 were between 31-50, and 17 were 50 years or more.

A more detailed view of the sample, by age and sex, is

shown in the following chart.

	<u>AGE</u>			
	<u>16-30</u>	<u>31-50</u>	<u>51+</u>	<u>Total</u>
Male	11	9	6	26
Female	7	4	11	22
<u>Total</u>	<u>18</u>	<u>13</u>	<u>17</u>	<u>48</u>

The Hopi Children's Sample.

A sample of 96 Hopi children was obtained. The instrument used was not elaborate, the primary information obtained being the Wechsler Children's Similarities Test (a measure of propositional performance) and the Street Gestalt Completion Test. In addition, scores from the California Achievement Test were provided by the principals of these two schools.

Two primary schools were used for gathering the data, one on the Second Mesa and one on the Third Mesa. Both schools were graded. The tests were mass-administered in groups of 7-15 students, the teachers not present. The interviews were given in English; children who were not fluent were interviewed in Hopi (by a Hopi).

The Survey Instruments: A Model

Constructing research instruments for this study was a time-consuming and difficult process. Many of the tests of cognitive functioning used for measuring performance in propositional and appositional thought are applicable for the study of brain-

damaged persons, but not for the study of "normal" persons. In the surveys, persons who had been knocked unconscious with a brain injury or concussion were excluded.

Many of the psychological tests available are not well-defined measures of either mode of performance, and many of those which are do not lend themselves to an interviewing situation. In addition, there are social forces which influence test performance which can lead to outcomes not predicted from neurological research or from psychology.

The interview schedules are, as a result, less than optimal instruments for testing the theory. They are sufficient, however, to provide a wealth of information on relationships between cognitive performances and socioeconomic behavior. The basic interview used for the adult urban and adult rural white sample is presented in Appendix B.

To construct this instrument, a model of the desired empirical content of the study was developed. This model has the following form:

1. Data were obtained on a number of social and demographic variables: sex, race, socioeconomic status (SES), and exposure to media.

2. Data were obtained on affinities for appositional and propositional thought, according to performances, uses, and values and preferences.

- a. Appositional performance is measured by the Street

Gestalt Test (Street, 1931).

b. Propositional capability is measured by:

(1) An Embedded Figures Test (Witkin et al., 1954).

In this test, a geometric configuration is overlaid with patterns of colors. Since the colors create fields, seeing the geometric subpatterns requires fragmentation of the fields, and field-independent (propositional) persons should be able to do it. A difficulty with the test is that high propositional performance requires low appositional performance, so that the two dimensions are confounded to some extent. Only limited use of this test is made in this report.

(11) A subset of five Raven Matrices (Raven, 1966) arranged in order of increasing difficulty.

(111) A systematic sample of ten words from the WAIS vocabulary test (Welschler, 1959). The children's form of the test was used in the Los Angeles and Hopi children's samples.

(iv) The WAIS Similarities Test (Welschler, 1959) was administered to all respondents, with the children's form used for all children. This test of categorical reasoning fits a definition of propositional thought as reasoning which partitions and fragments reality as a way of knowing.

3. Data on values and preferences was obtained from:

a. Materials from the Barron-Welsh Figure Preference Test. Respondents were asked to indicate which of the three figures they liked the best, and why they selected the ones

they did.

- b. A set of eight figures from the Barron-Welsh test were used to measure preference for linear figures.

- c. Four triplets of abstract figures (developed by Professor John F. Marsh, Jr.) are presented. For each triplet, respondents are asked to identify one which is "Most representative of yourself" and another "Least representative of yourself."

4. Data pertaining to use of the two modes is measured by:

- a. Materials from the Barron-Welsh Figure Preference Test (the two pages of three figures).

- b. A number of questions in the body of the questionnaire.

5. Data on suitability of respondents for the educational system:

- a. Occupational status, occupational classification (job title), attitudes toward education, value placed on education, grades, amount of education, and personal styles.

- b. It could be argued that the measures of propositional performance measures suitability for the educational system (Cohen, 1969).

Further description of the performance measures will be presented in the next chapter. Other variables will be described as they occur in the data analysis to follow.

VI. A COMPARATIVE ANALYSIS OF COGNITIVE PERFORMANCE

In the adult surveys four measures of propositional performance and one measure of appositional performance were administered. Since the rural white adult sample expressed reluctance to respond to one measure of propositional performance--the Witkin Field Independence Test--a decision was made to exclude this measure and thereby raise comparability between urban and rural samples. The three measures used for this purpose are: the 12 items in the WAIS Similarities Test; a systematic sample of 10 words from the WAIS Vocabulary Test; a subset of 5 Raven Matrices. Thus a total of 27 items are used to measure propositional performance. A single measure of appositional performance will be used: the first 12 of the 13 items in the Street Gestalt Completion Test.

There exists adequate evidence that the Similarities and Vocabulary Tests measure left hemisphere performance. For Raven Matrices, the evidence is problematical. Neurological studies indicate that persons suffering from aphasia (loss of speech) lost IQ test performance (which primarily measure left hemisphere functions), while retaining capability to do Raven Matrices. In fact, Zangwell(1964) reports that severe aphasics did better than average on the Raven Test. Smith (1964, p.205) suggests Raven performance may reflect general intelligence and have low k-loading. Thus the evidence is not entirely consistent.

In spite of these cautions, however, Raven Matrices do seem to lend themselves to propositional solutions, and further, field experience in this study indicates most persons in fact solve Raven Matrices through the construction of a "rule" or "proposition".

There also exist difficulties with the Street Test. While certain items on the test are clearly culture-bound and somewhat dated, these biases are conservative with respect to the theory under investigation, as the cultural content of the items should be most familiar to whites. Since whites are hypothesized to score lower than blacks, this bias should attenuate differences in favor of the null hypothesis.

A second problem is that prior investigations have found the test to have relatively low k-loadings (Sultan, 1962). Third, Smith(1964, p.205) suggest it can be solved through recognition of details (according to Smith, a nearly defining feature of verbal intelligence). Experience with the test, however, indicates that the two trial items and the Japanese Soldier are the only items for which what Kaplan calls "structural instances" contribute to the solution.

There are other considerations in favor of the test, which led to the decision to use it as a measure of appositional performance. First, field experience indicates that it has a high level of face validity, i.e., persons who, on the face of it should be appositional thinkers (e.g. musicians) obtain

high scores, whereas persons who should be propositional thinkers (e.g. mathematicians) do not obtain high scores. Second, the test is directly interpretable as reasoning from fragments to a whole, as a visuoconstructive task, and as pattern recognition.

In the present discussion a preliminary effort will be made to resolve these difficulties empirically. If Raven Matrices belong with the left hemisphere tests, a factor analysis should load the items from this test in a common factor with the Similarities and Vocabulary tests. Further, the Street Test should form a second factor. In this way, we can let the data speak for themselves, and then pursue an analysis of why things might be as the data indicate.

Factor Analysis of Performance Items

To examine characteristics of items rather than respondents, an R-factor analysis is in order. Principal component factoring with 25 iterations is used. Since it is argued that propositional and appositional performances are complementary--a moderate correlation between factors representing these dimensions of mental performance is expected. Hence, oblique rotations with delta set a zero, and with Kaiser normalization, is used. Since we presume to be measuring two mental factors, the number of factors is set at two.²⁵

In the resulting data, Factor I attracts the Similarities, Raven, and Vocabulary items, whereas Factor II attracts the Street

items. Hence, Factor I is named "propositional performance" and Factor II "appositional performance". The eigenvalues obtained for Factors I and II are 4.22 and 1.67, with the corresponding percentages of variance 71.6 and 28.4. The two factors are correlated at $r = .16$, the expected weak positive outcome. The factor correlation matrix between the summated ratings of the test scores is shown in Table 10. The factor patterns, after rotation, are shown in Table 11.

The data in Table 11 show one Similarities and two Street items which--while the weights are in the predicted direction--are poor indicators of their factors. As expected, the difficulties focus on the Raven items: two of the five items show little loading on either factor, and the differences favor Factor II. The other three items are, as anticipated, loaded on Factor I. Thus, while two items appear to measure neither factor, the overall test appears to measure propositionality: the mean loadings for the five items are Factor I, .19 and Factor II, .03; the corresponding squared terms are .036 and .001. Thus, even with the two suspect items included, these items contribute almost all of their variance to Factor I.

From this analysis it can be concluded that--for the population under analysis--Raven items measure propositional performance. Why, then, the negative evidence cited above?

It is this writer's view that Raven matrices can be solved

Table 10

Product Moment Correlations Between
Performance Measures: Urban Adult Samples
(N=1,047)

	WAIS Similarities	Raven Matrices	WAIS Vocabulary
Gestalt completion	.11**	.11**	.06**
WAIS Similarities		.14**	.47**
Raven Matrices			.23**

**p < .001

Table 11

Factor Loadings on Performance Measure Items,
for Principal Component R-Factor Analysis
with Oblique Rotation (Delta=): Urban Adult Samples

Factor 1			Factor 2			Factor 1			Factor 2		
Test, Item		Prop.	App.			Test, Item		Prop.	App.		
Similarities						Vocabulary					
1		.18		.04		1		.20		.03	
2		.22		.06		2		.31		-.01	
3		.22		.07		3		.32		.05	
4		.45		-.02		4		.48		.04	
5		.39		-.01		5		.51		-.01	
6		.20		-.09		6		.43		-.07	
7*		.18		.10		7		.58		-.06	
8		.31		.08		8		.57		-.04	
9		.41		.04		9		.69		-.11	
10		.48		-.04		10		.62		-.10	
11		.42		-.03		Street					
12		.44		-.00		1		-.01		.21	
						2		.02		.18	
						3		.00		.20	
						4		.00		.47	
						5		-.06		.30	
						6		-.03		.46	
						7*		.16		.20	
						8		.08		.43	
						9		.03		.40	
						10		-.17		.58	
						11		.01		.48	
						12*		.07		.10	
Raven											
1		.33		-.06		1		.33		-.06	
2*		.08		.11		2*		.08		.11	
3		.29		.03		3		.29		.03	
4		.31		.00		4		.31		.00	
5*		-.07		.07		5*		-.07		.07	

*Denotes items whose loadings differ from prediction.

either propositionally--through construction of a verbal proposition, or appositionally--through recognition of a pattern. Hence, it is not surprising that the test shows a high loading. Since the propositional solution is generated entirely from visual information arranged in a pattern, the "propositional" and "pattern" solutions are isomorphic. Further, it may be that a mixed strategy could confound the problem-solving process, and that it is best solved by either hemisphere operating in relative isolation. Such an explanation could account for for present data--which suggest these matrices are solved by most respondents propositionally, and the neurological data indicating persons with left side damage can work the problems without difficulty. Conversations with pre-test respondents indicate both propositional and pattern strategies can be used; in addition, certain respondents indicated they worked problems both ways, by which seem right "by deduction" and which "looked right". Hence, persons who are able to integrate their hemispheres have at their disposal an internal validity check.

This explanation can be evaluated by examination of the test items, to see if isomorphic proposition and pattern solutions can be obtained. Only the second item is positive loading on both factors. It is shown as Figure 1. The correct answer is "2", the circle inside a square. There are two solution strategies. First, consider a propositional solution:

1. For every symbol, if it occurs in the first two rows (or columns), then it does not occur in the third row (or column);
2. For every symbol, if it occurs in exactly one of the first two rows (or columns), then it does occur in the third row (or column);
3. In the third row and third column, the "cross" occurs in the first two positions, so by condition "1", it does not occur in the solution; the square and the circle both occur just once in the first two positions, so they both occur as the solution.

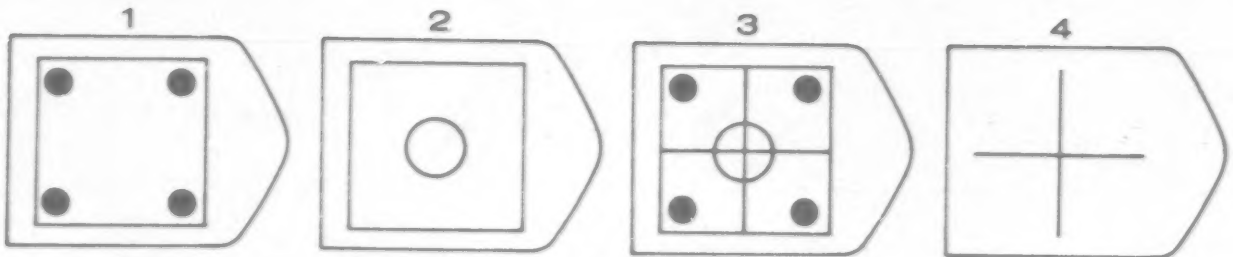
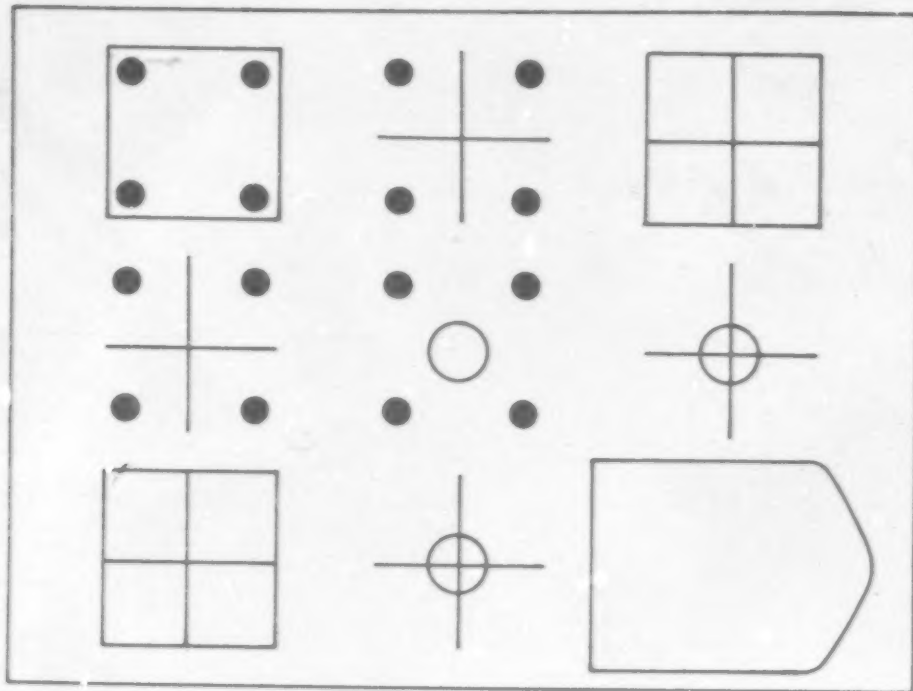
Second, consider a pattern solution:

1. There are four symbols in the matrix, each of which forms a pattern. The crosses form an ellipse which does not include the solution cell.
2. With a square in the solution cell, the squares form a square of squares. Thus, a square should be included in the answer cell.
3. The dots form a square pattern in the upper left corner. For symmetry to be preserved, the circles should form a square in the lower right corner, which requires a circle in the answer cell. Therefore, the answer is a square and a circle, i.e., "2".

Both solutions lead to the same answer. It is not possible to attribute greater validity, or more internal "logic" to one than the other. In fact, working the problem both ways enhances confidence that "2" is, as Raven claims, the answer.

So, why might the loadings for this particular item be greater for the appositional factor (the square of the loading is twice as large)? There may be a simple answer to this problem: in this case, the pattern solution is easier. Since most "test wise" adults know that propositional reasoning is regarded in test situations, they will proceed in this manner. In the

Raven Matrices Test: Item No. 2



pre-test, many clearly appositional types (e.g., left-looking musicians) indicated they tried to solve the figures propositionally because they thought that was what was expected of them. Perhaps, after left side damage, persons are forced into the appositional mode for this test, and do even better on it by that method. If so, a possible explanation would exist for the apparently inconsistent neurological and sociological outcomes. Of course, testing such a hypothesis would require extensive research and this discussion is at most suggestive.

The Street item that loaded on the propositional factor (.16) as well as the appositional factor (.20) was the Japanese soldier. This figure is, as mentioned, the only item for which details give away the answer. In Figure 2 it can be seen that the bayonet and cap reveal the gestalt. By comparison, the horse and rider in Figure 3 do not have "structural instances".

Measures of Propositional and Appositional Performance

An index of propositional performance is constructed by linearly transforming the three propositional factor tests so that they each range from 0 through 10. A summated rating over these three test scores produces an index ranging from 0 through 30.

Before descending into the substantive analysis, an additional measurement procedure is necessary. Table 10 and the factor analysis indicate that propositional and appositional

FIGURE 2

Street Gestalt Completion Test, Item 7

7

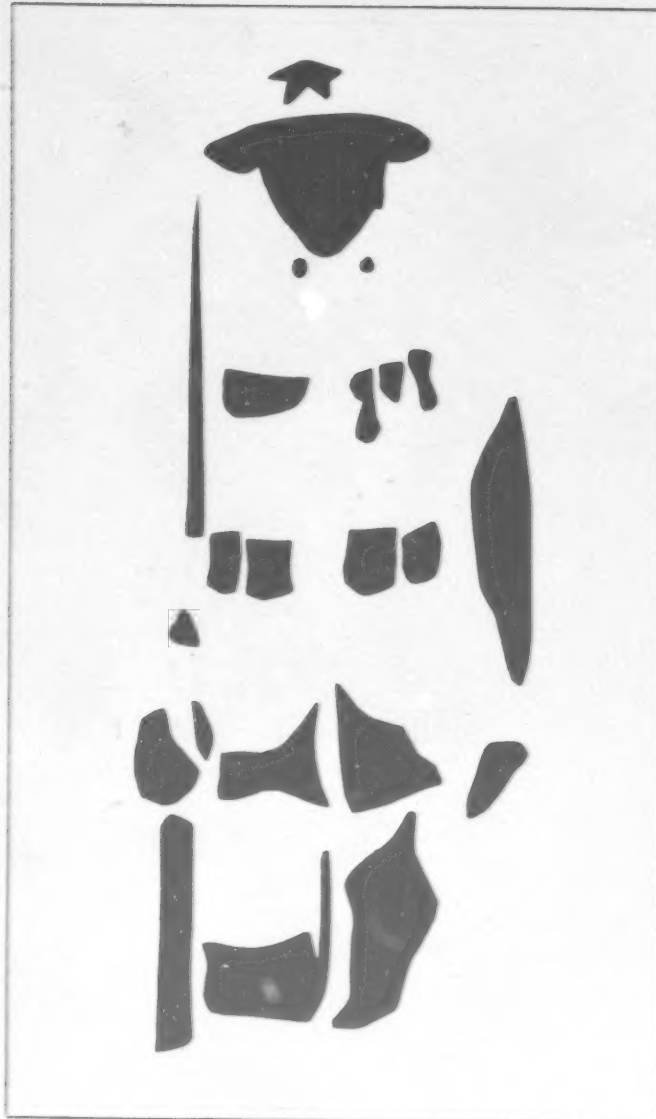
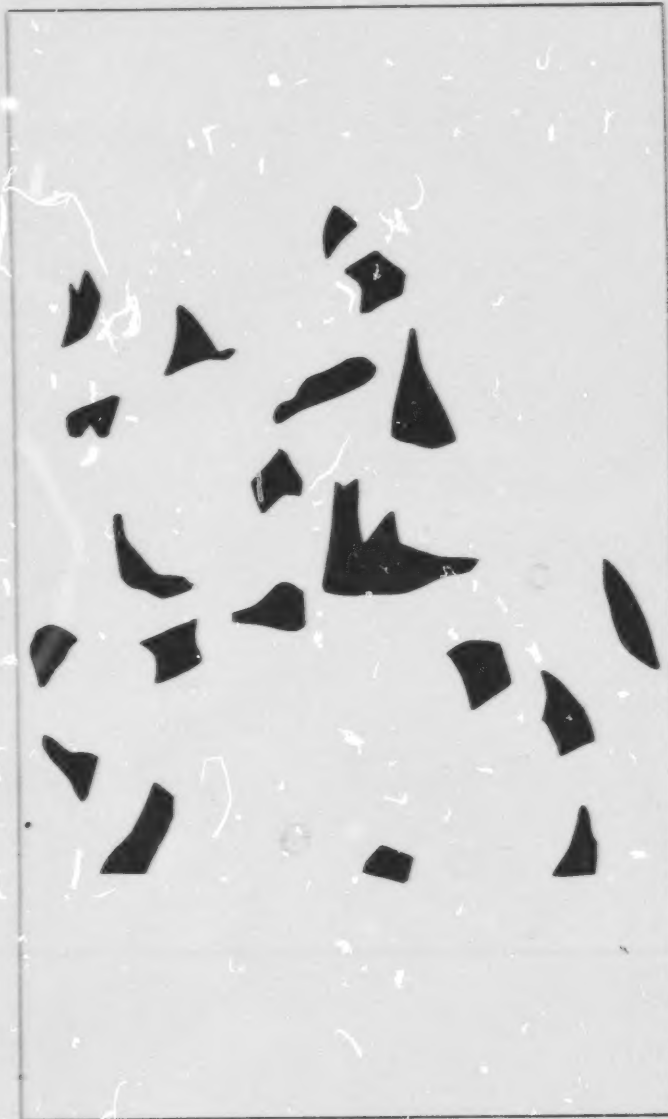


Figure 3

Street Gestalt Completion Test, Item 8

8



performances are positively correlated. In addition, they can be expected to interact with each other in their relationships to dependent variables. With this in mind, a typology should be constructed. To do this, both measures are trichotomized, to place respondents into into three groups nearly equal in size for each measure. Propositional index scores 0 through 16 are scored "low", 17 through 19 "medium", and 20 through 30 "high"; Street scores 0 through 5 are "low", 6 and 7 "medium", and 8 through 12 "high". The trichotomized indices are then crossed to form a typology of nine types.

For the rural adult samples, cutting points for the urban samples are used. For Hopi adults, the urban adult sample's cutting points are used for the Street Test. Since they took only one propositional test--Similarities, the urban sample's Similarities scores were trichotomized to form three groups of nearly equal size. The Street and Similarities measures were then crossed, forming a typology comparable to that for the urban and rural white adult samples.

The Data: Performances by Location, Race, and Sex

Table 12 shows mean performances scores for the four tests and the index of propositional performance. There are clear cross-cultural differences for Street performance. The Hopi scores are, as predicted, higher than those for any other group. Since rural white farm culture is an admixture of propositional American society and an oppositional subculture, they should

Table 12

Mean Performance Scores on Gestalt Completion,
WAIS Similarities, Raven Matrix, and WAIS Vocabulary Tests,
and the Index of Propositional Performance, by
Location, Race, and Sex:
Urban Adult Samples

	Urban				Rural		Hopi	
	Black Female (287)	Black Male (245)	White Female (307)	White Male (374)	Female (27)	Male (54)	Female (23)	Male (26)
Gestalt	7.1	6.7	6.6	6.7	7.5	7.0	9.2	9.3
Similarities	12.9	13.0	15.8	15.3	14.6	15.1	12.0	13.3
Raven	1.4	1.4	1.8	1.8	1.6	1.1	--	--
Vocabulary	5.5	5.4	7.8	7.6	6.3	5.5	--	--
Prop. Index	15.4	15.1	19.2	19.2	17.0	16.6	--	--

be higher on oppositionality than the urban groups. And within the urban groups, the environment for blacks is an admixture of white culture and the oppositional black culture. It is predicted that the oppositional performance as opposed to propositional performance should be higher for blacks than for whites. The mean for blacks is 6.9, compared to 6.7 for urban whites. The means for rural whites is 7.2 and for the Hopi 9.3.

The Street Test shows almost no within-race sex differences. The single exception is found among urban blacks, where the female mean exceeds the male by .5. This outcome supports the theoretical position developed in Chapter IV.

On the Similarities Test, Hopi and urban black scores are comparable, and urban white scores are higher. As predicted, within-race sex differences are small and non-significant.

Similarities Test outcomes are coordinate with those for the Raven and Vocabulary Test, and for the Index of Propositional Performance. For the Index, sex differences are very small. Black females had outperformed black males on the Street test by .4; they outperform black males in the Index by .3. Thus, there is no sex difference in relative propositionality within the black samples.

The percentages distributions of scores on the Index of Propositional Performance and the Street Test are shown in Tables 13A and 14A.

Although the Witkin Field Independence Test is not going to be used in the analysis, this test is an empirical indicator of propositional performance, and the scores therefore bear on the theory. The obtained means for the urban samples are black females 1.5, black males 1.6, white females 2.7, and white males 3.0. Thus, the hypothesised differences are again obtained: whites outperform blacks, and there are virtually no within-race sex differences.

Table 15 shows the percentages of respondents in each of the nine categories of the typology. The values vary widely by race, but very little by sex groups within races. Except for the Hopi, for whom about half the respondents are in the high appositional, low propositional category, the concentrations tend to fall not into single types, but into groups of types: urban blacks show the greatest concentration in the (low, low) category, indicating this race group faces the greatest obstacles and are most apt to develop neither type of performance; urban whites concentrate in the next three categories; urban blacks and rural whites into the next three; and urban whites into the final two categories. This clustering is hardly surprising, for substantive interpretations of these subsets of types are readily seen. The top category designates respondents who have attained performance in neither category; the next three, those for whom the propositional score is larger; the

Table 15

Percentages of Respondents in Each of Nine
Categories of Propositional and Appositional
Performance, by Location, Sex, and Race:
Urban Adult Samples

Combination App. Prop.	Urban				Rural		Hopl	
	Black Female	Black Male	White Female	White Male	Female	Male	Female	Male
Low Low	13	19	6	9	7	13	0	4
Low Med.	7	7	7	8	4	9	0	0
Low High	5	3	15	11	4	4	0	0
Med. High	5	6	20	20	7	2	4	0
Med. Low	19	20	6	7	11	20	9	4
High Low	23	17	5	5	11	20	52	50
High Med.	15	11	7	9	40	13	22	14
Med. Med.	8	13	13	12	11	9	9	28
High High	5	4	21	19	4	17	0	4
Total Percent	100	100	100	100	100	100	100	100
Number	(287)	(245)	(307)	(374)	(27)	(54)	(23)	(26)

next three, those for whom the appositional score is larger; and the final two, those for whom performance is present and is balanced between the two modes. (It would not be accurate to refer to these two cases as "integrated" thinkers, as they could have high performance levels with both hemispheres working independently, yet little inter-hemispheric cooperation.

Because of this clustering, its substantive interpretations and empirical clustering of race groups, the typology can be reduced to four categories with virtually no loss of substantive information. The resulting summary typology, by location, race, and sex, is shown in Table 16.

For the Hopi, 84 percent of the females and 78 percent of the males fall into the appositional type. For rural whites, the appositional type is again modal, the percentages being females 46 and males 62. It was suggested earlier that the influence of the appositional farm subculture might make the dominant male group appositional relative to the females. This outcome is obtained. In the urban samples, a clear race difference can be seen. For both sexes, the percentages propositional are blacks 17 and whites 40; the percentages appositional, blacks 54 and whites 20. The relative propositionality scores (defined as $(Pr.-Ap.)/(Pr. + Ap.)$) computed from these percentages are blacks $-.52$ and white $.33$. Thus, as predicted in Chapter II, blacks are less propositional and more appositional

Table 16

Percentages of Respondents Classified as
Neither, Propositional, Appositional, or
Balanced Types, by Location, Sex, and Race:
Adult Samples

Cognitive Type	Urban				Rural		Hopi	
	Black Female Pct.(N)	Black Male Pct.(N)	White Female Pct.(N)	White Male Pct.(N)	Female Pct.(N)	Male Pct.(N)	Female Pct.(N)	Male Pct.(N)
Neither	13	19	6	9	13	7	0	8
Propositional	17	16	42	39	15	15	8	0
Appositional	57	48	18	21	46	62	84	78
Balanced	13	17	34	31	26	15	8	20
Total Percent	100	100	100	100	100	99	100	100
Number	(287)	(245)	(307)	(374)	(27)	(54)	(23)	(26)

than are whites. In both races, the relative propositionality is lower for females than for males, but these differences are small.

A Discriminant Analysis Through Theoretical Sampling

In this section a new methodology is constructed to elaborate and further test the theory. At the outset, an additional substantive argument is required. The principal component analysis presented in Chapter IV led to the conclusion that, within races, females are more specialized than males. It should also be the case that blacks are more specialized than are whites. Black people in urban America are forced to choose between restriction to the ghetto, which cuts them off from the resources of propositional white culture, or committing themselves to achievement in a white-dominated society, which cuts them off from their own appositional culture. The selection of either world results in cognitive specialization.

There is a methodological strategy for testing this extension of the theory, and to provide further testing of the results of Table 15 and 16. If blacks are less propositional and more appositional than are whites, then a systematic analysis of purer and purer types should intensify the direction of this difference; in addition, black specialization or white despecialization should be observable. Therefore, if blacks are lower on relative propositionality, as we look at extreme types (highly propositional only, finely balanced, and highly

appositional only), the extreme propositional types should be black, and the extreme appositional types white. In this way, cognitive mode is used to discriminate race--hence, the term "discriminant analysis".

The following measurement procedure will be used. The indices for propositional and appositional performances can be divided into two categories (of nearly equal frequency). This produces four cells, that can be labeled "neither", "appositional", "propositional", and "balanced". Then, the indices can be divided into three categories each, and the high appositional-low propositional cell and the medium-medium and high-high cells called "balanced". The same procedure could be used for four divisions, five divisions, and so forth.

This sampling within the sample can be defined as theoretical sampling. At one level, this means we are selecting cases from which variables under investigation are most nearly independent of processes extraneous to the theoretical topic. The theory provides a basis for selection of types that is entirely objective and deterministic. This sampling method differs radically from statistical sampling, where selection is carried out with a total lack of structure (i.e. at random). Thus we see theoretical sampling and statistical sampling as opposites : theoretical sampling is maximally structured; while statistical sampling is minimally structured. While statistical sampling constitutes inquiry into the structure of luck,

the theoretical sampling constitutes inquiry into the structure of theory.

The results of this analysis are shown in Table 17. There are two phenomena of interest in this table which pertain to the principal components direction and intensity (specialization). (Note that the "neither" types are not included in the analysis.) Black females and black males are less propositional than appositional at every stage of theoretical sampling, and there is a general tendency for both propositionality and appositionality to decline (an artifact of the measurement procedure). But in general the percentages propositional decline far more rapidly, so that by stage 6 the percentages in propositional and appositional types are females 0 and 44 and males 2 and 30. Thus, we can predict race for both the groups almost without error from a 6th level theoretical sample.

The data for whites show an opposite pattern. Both propositional and appositional types decline, and the percentages of appositionals declining more rapidly. By stage 5, the percentages in propositional and appositional types are females 29 and 5 and males 24 and 1. But at stage 6, something happens to the white sample that did not happen among blacks. The percentages of persons specialized in either type declines radically for both sexes. Thus, blacks are seen--from within the theoretical sample--to be more specialized than are whites, which constitutes positive evidence for the argument presented

Table 17

Percentage Distributions of Propositional, Balanced, and Appositional Cognitive Modes, for Theoretical Sample Created by Division of Propositional and Appositional Performances Into 2, 3, 4, 5, and 6 Categories, by Race and Sex: Urban Adult Samples

		Number of Measurement Categories				
		2	3	4	5	6
Black female	Prop.	15	12	8	10	0
	Bal.	20	32	47	47	56
	App.	65	56	45	43	44
	Number.....	(202)	(117)	(62)	(51)	(49)
Black male	Prop.	14	8	2	2	2
	Bal.	20	46	56	68	68
	App.	66	46	42	30	30
	Number.....	(152)	(91)	(54)	(46)	(46)
White female	Prop.	39	28	24	29	8
	Bal.	45	63	72	66	87
	App.	16	19	4	5	5
	Number.....	(252)	(165)	(107)	(89)	(66)
White male	Prop.	39	24	20	24	9
	Bal.	45	66	76	75	90
	App.	16	20	14	1	1
	Number.....	(298)	(135)	(118)	(99)	(82)

at the outset of this section.

This analysis does not, however, reveal sex differences in specialization within races. To pursue this analysis, it is necessary to define an empirical indicator of level of specialization. For the basic typology shown in Table 15, the absolute value of the difference in categories, propositional minus appositional, provides a measure of specialization. Thus the (low, high) and (high, low) types are assigned the value 2; (low, low), (medium, medium), and (high, high) types 0; and the other four types 1. Table 16 shows the distributions by race and sex.

As expected, blacks are more specialized than are whites. The mean levels of specialization are blacks .95 and whites .78. But with these data it is also possible to observe the predicted specialization of females within race groups. The values for blacks are females 1.02 and males .84; for whites, females .80 and males .76. This adds some positive evidence for the basic theoretical position set forth in the analysis of principal components of cerebral duality.

Let us summarize the results of Table 17 and 18. We have seen that blacks are more specialized than whites, and that within races, females are more specialized than men. A more general view of the data can be derived by constructing another variable, the extent to which a person is ascriptively subdominant. Clearly blacks have one subdominant characteristic

Table 18

Percentage Distributions of Level of Propositional
or Appositional Specialization, by Race and
Sex: Urban Adult Samples

Level of Specialization [Pr.-App.]	Types	Black Female	Black Male	White Female	White Male
2	(L,H)(H,L)	28	20	20	16
1	(L,M)(M,H)(H,M)(M,L)	46	44	40	44
0	(L,L)(M,M)(H,H)	26	36	40	40
Total percent		100	100	100	100
Number		(287)	(245)	(307)	(374)
Mean Level		1.02	.84	.80	.76

due to their race. Similarly, females have one subdominant characteristic due to their sex. Now if we define the number of subdominant characteristics as the variable of interest, the following assignments follow: black females 2, white females 1, black males 1, and white males 0. The four pairs of observations (2, 1.02), (1, .84), (1, .80), (0, .76) yield a product moment correlation of .93, indicating that 86 percent of the variance in specialization is accounted for by the number of subdominant characteristics possessed by a race-sex group.

The sample sizes do not permit parallel analyses for the rural white and Hopi samples. Thus, we can now turn to the two remaining tasks for data analysis. First, an effort will be made to construct an overview of the data, describing the propositional and appositional uses, values, preferences, and uses of respondents in varying social circumstances. Then, certain behavioral outcomes (personality organization, suitability for the educational system, socioeconomic status, and work alienation) will be related to the performance measures. In this way, it is possible to demonstrate consequences of cognitive style on other variables.

VII. COGNITIVE STYLES: VALUES, PREFERENCES, USES

At this point we have documented systematic differences in propositional and appositional performances. This chapter analyzes data pertaining to other dimensions of the two modes--values, preferences, and uses. In so doing, an overview of the data is constructed, and further elaboration of the theory established.

The first set of data to be considered derives from pre-coded answers to the question: "in order to be successful, which of the following do you think a person must be?" Table 19 shows the responses, grouped according to propositional, appositional, and integrative criteria for success. First, let us ignore the rural respondents and focus on the urban samples. It has previously been shown that blacks are relatively less propositional than are whites for performance measures. Here, we observe something odd--i.e., that whereas whites are highly propositional they seem to value certain appositional criteria for success more than certain propositional properties. To both female and male whites the highest percentages of agreement was found on the appositional response "Perceptive (83 and 81 percent, respectively). White females agree that cooperativeness (another appositional property) is a criterion for success on the level of 68 percent, while 58 percent of males agree to this response.

Table 19

Percentages of Respondents Agreeing With
Items Pertaining to Propositional,
Appositional, and Integrative Criteria for Success, by
Location, Race, and Sex: Adult Samples

Criteria for Success	Urban				Rural	
	Black Female	Black Male	White Female	White Male	Female	Male
<u>Propositional</u>						
Consistent	80	80	60	65	82	90
Organized	80	80	60	65	52	52
Educated	64	65	42	42	81	91
Decisive	63	60	57	66	85	87
Leader	34	41	23	38	52	68
Competent	63	67	36	47	85	89
Intelligent	84	88	63	70	74	81
<u>Appositional</u>						
Cooperative	63	66	68	58	92	85
Moral	41	46	46	41	37	33
Lucky	31	36	40	40	66	83
Perceptive	64	67	83	81	24	54
<u>Integrative</u>						
Creative	71	70	64	70	33	42
Number(N)	(287)	(245)	(307)	(374)	(27)	(54)

This places appositional property within the range of such highly valued propositional properties as consistency, organization, decisiveness, and intelligence. Summarily, we may conclude that whites--though not devaluing propositionality--find value in certain appositional criteria on levels that are higher than any propositional items and do not descend below the range of the lowest propositional item. (Compare the appositional response "Lucky," 40 percent male and 40 percent female, with the propositional item "Leadership," 23 percent female and 38 percent male.)

When we look at the blacks an inverse yet isomorphic relationship is discovered. Blacks are high appositional performers, nevertheless consider propositional criteria as being the most valued for success. Blacks agree on levels of 80 percent or higher that the propositional items "Consistency," "Organized," and "Intelligent" are criteria for success. The lowest item is an appositional one--lucky--which tallies 31 percent for females and 36 percent for males. Only the appositional items cooperativeness and perceptiveness fall within the same range as the middling propositional items educated, decisive, and competent.

Now the somewhat odd findings find a reasonable interpretation if one considers the dynamics of racism in society. It is not surprising that blacks agree that propositional criteria are the important criteria for success. Fully aware of their existence in a "white man's world," the only avenue for success is suppression of their appositionality in favor of striving for

a propositional cognitive style that is synonymous with how the white man thinks. Fanon, for one, has systematically explored this dynamic in Black Skins, White Masks. In terms of the arguments developed here, Fanon's argument describes "appositional performance, propositional success."

That whites, though dominant, are not free from the controls of institutional racism is also mirrored in the table. Note that whites, though scoring high on propositional performance, nevertheless value certain appositional items more than propositional ones. Seemingly, like blacks, they are aware of their socially imposed limitations on cognition, and may fantasize that success can be their if they could only develop their appositional sides. Unconsciously, this may mean an idealization of the black "hustler"--a longing to develop the perceptiveness they see in the black world. Indeed Norman Mailer's categorization of the White Negro may be more general than just "two-bit hipster."

At this point, the table points to a highly probable fact-- i.e., that both whites and blacks tend to project their criteria for success on something that they see themselves as lacking but that is defined to exist absolutely in their racial counterparts. This mutual projection seems to be the result of living in a society where success, though expected, is seemingly not consistent with performance. That both whites and blacks are frustrated in the society is evident from responses to the item: "Is there anything else you'd rather be doing?" Here 57 percent of the

whites as compared to 21 percent of the blacks want another job. Perhaps to a black any job is considered a God-send and such "rathering" considerations are not indulged in. (A five-item scale of work alienation, however, indicates no race-sex differences in the urban sample: see Table 34).

Hitherto we have limited the analysis to only the urban white sample within Table 19. With the introduction of the rurals a transformation takes place which specifies the nature of the success variable. The whites and blacks have been shown to be consistent in that though scoring high on one performance mode, value for success is placed on the other mode.

The rurals, on the other hand, do not seem to get into such a pattern. With the exception of one propositional item-- "organized"--they score higher on agreement with all propositional items than at least one of the urban sub-groups. On several propositional items they score the highest--"Consistent" (female 82, male 90), "Educated" (female 81, male 91), "Decisive" (female 85, male 87), "Leader" (female 52, male 68), and "Competent" (female 85, male 89). The data show that the rural value propositionality higher as a group than does do any urban sub-groups. If they fit the previously described urban pattern we would expect them to do so in that they are appositional performers, but we would not expect them to show high agreement on the appositional items. However, whereas they show a surprisingly low agreement on two items they score well above any urban sub-group:

The percentages are "Cooperative" female 92 and male 85; and "Lucky" female 66 and male 83. On the "Moral" item they do not differ significantly from the urbans. Thus, instead of a mutual projection we find a pattern of high agreement going through both appositional and propositional modes. At this point we may begin to infer that rurals belong to a radically different social order than do urban blacks and whites; but what could this order possibly be?

A tentative answer may be derived from further inspection of Table 19. In addition to propositional and appositional modes, the table includes "Creative," an index of an integrate mode (see Bogen and Gazzanaga, 1965). Here something startling is observed. Whereas both white and black urban groups agree consistently high on the item (blacks females 71, black males 70, white females 64, and white males 70) the rurals score relatively low on the item (females 33 and males 42)..An interpretation of this calls for clarification of the meaning of the table.

Prior to the consideration of the integrative mode patterns of agreement on the relevance of cognitive modes were described, and linked to a theoretical construct. Let us term this construct value: That is, a response to an item as a criterion of success implies the respondent imputes a certain value on a particular mode. This value is inextricably linked with the respondent's cognition of social order. It was found that whites value appositionality in certain instances more than they do propositinality.

and that these qualities are seen as missing components. The same hold true for blacks, the value being imputed to proportionality. Rurals on the other hand do not seem to share these projections in that they value both modes almost equally. In a real sense this position vis-a-vis the urbans seems to be derived from the fact that rurals occupy a positions outside of the race complex. In valueing both modes they cannot be said to manifest the projection observable within the urban sample. Although aware of being in a frustrating situation (Table 20A shows that 55 percent of the females and 62 percent of the males would rather have another job.), they seem to hold that the development of a social counterpart's mode of cognition would not provide a solution. In fact, as we shall see shortly, they do not seem to see themselves as involved in a situation of social deprivation in which a remedy lies in integrating the strengths of a social counterpart. In fact there probably exists no such social counterpart, so "naturally" present in the urban world. Thus the malaise of the rurals exists on a differing plane.

How are we led to such a conclusion? That rural malaise is highest is evident from their high scores (females 55 and males 62) on the "Rather have another job" question. That this malaise exists on a level qualitatively different plane than the level of value is shown by the "Creative" item in Table 19. Rurals are far less apt to make this response than are urbans. Thus, among rurals, although both cognitive styles are valued, creativity mode is seen as relatively non-pertinent. Thus, the urbans

almost seem to look toward the integration of their cognitions as a social ideal, whereas the rurals do not.

This interpretation points to a dogged fatalism on the part of rurals. Although they agree that these things we term cognitive modes are of definite values in everyday existence, they seem to be of slight relevance. In other words, although the possession of these modes might be of value on a social level, the integration of them has little meaning to rurals.²⁶ Seemingly, creativity is a shared value in an urban contest where success depends on presenting yourself to others as a person who can "make" something of his life. On the farm, however, one observes the saw: "Nothing is created, yet everything is born." For rural life engages a man in dealing directly with natural forces-- and in terms of the natural forces man is relatively powerless and subdominant. His cognitive acuteness is of little help (among rurals, the response "Perceptive" is endorsed by a low 24 for females and 54 for males). A lack of rain for one season could be financial disaster; pests and diseases can ruin crops and livestock. At the mercy of the elements a man's creative expressions are of little value. The concreteness of the propositional and appositional items are real to the rural mind, but what can such an abstraction like creativity mean to a man who is dealing directly with nature.²⁷ A man may value another man's creativity, but can we say that nature likewise holds to this anthropomorphism? And it is just with this natural order of reality that the rural spends most of his life. Thus, a man may value certain

human cognitive modes, but this is and of itself has only a relative bearing on success.

Such an interpretation allows us to introduce another formal theoretical level--that of preference. That is, the consideration of the rurals vis-a-vis the "Creative" item introduces the possibility that an individual, though he or she may value one or both cognitive styles, will not necessarily show any preference in the orientation of these modes toward finding creative solutions to problems. At least this seems to be the case with the rurals. Whereas the urbans view the possession of these modes as power to effect existential solutions, to the rural these modes exist as more or less passive projections in the face of the uncertainty presented by nature. For where nothing is created but only born, the only position one can take is that of a midwife to forces that are fundamentally beyond control. In the last analysis to the rurals both modes are positively valued, but to prefer them over any other human function is relatively meaningless. Compared to the urbans, the existence of cognitive modes is not at all as fundamental.

In considering the above one must not equate this lack of preference with a lack of use. In fact, use provides us with another theoretical dimension that is specified most clearly through the scrutiny of the rural sample. Table 22 indicates how linear and nonlinear abstract figures are most and least like themselves. Linearity is, at some level, a component of

Table 22

Percentages of Respondents Indicating Linear and Non-Linear Abstract Figures are Most (M) and Least (L) Like Themselves, by Location, Race, and Sex: Adult Samples

Figure Type Figure	Urban				Rural			
	Black Female		Black Male		White Female		White Male	
	M	L	M	L	M	L	M	L
Linear		26 37	26 37	26 31	16 35	36 24	32 12	
		22 37	26 31	14 52	20 38	12 48	50 14	
		24 52	30 48	12 66	16 59	8 42	47 26	
		16 50	13 52	9 64	14 55	4 69	26 56	
		20 36	26 36	15 56	22 46	12 42	64 16	
Mean percent		22 42	24 40	15 54	18 47	14 45	44 25	
Non-linear		51 22	47 26	70 14	54 20	52 28	18 74	
		59 24	52 30	67 10	51 19	65 15	35 31	
		16 23	18 22	21 23	33 23	27 42	18 43	
		31 26	41 22	26 25	29 24	48 15	26 24	
		53 24	45 25	65 11	57 21	48 15	48 20	
		30 39	34 37	30 29	28 30	24 38	14 50	
		50 25	40 26	56 16	52 23	64 19	22 34	
Mean percent		41 26	40 24	47 18	43 23	47 24	26 39	
Number		(287)	(245)	(307)	(374)	(27)	(54)	

propositionality, whereas nonlinearity is a component of appositionality. Among the urban respondents, all four race-sex groups indicate that linear figures are least like them and that nonlinear figures are most like them. The only exceptions are found in the third and sixth nonlinear figures, which are, among this group, the most nearly linear. Except for these two figures, there is no other exception. The same result is obtained for rural females, with three exceptions: the first linear figure (the cone), and the third and sixth nonlinear figures. However, among the rural males it is the linear figures which are most like themselves. There are four exceptions, but for the mean percents, the following results are obtained: 44 percent find the linear figures most like themselves, as compared to 25 percent finding them least like themselves; 26 percent find nonlinear figures most like themselves, as compared to 39 percent finding them least like themselves. Thus the single finding in this table is that only the rural male farmers identify themselves with linear figures.

Since on the performance measures (Table 16), 62 percent of these farmers are categorized as appositional and only 15 percent propositional, this finding is most interesting. The two sets of findings can be brought together by comparing cognitive mode to the mean score on linearity of figure identification with self. To do this, a summated rating for linear identification (range 0 through 11) is constructed. The data are shown in Table 23A. These data show little dependence between

the variables cognitive mode and linear figure identification with self. For the rural male farmers, there is no difference: the mean scores for the propositional and appositional types are 4.4 and 4.5.

Thus we must look elsewhere for an explanation. Inspection of the figures in Table 22 reveals that the nonlinear are more open, more evident of freedom of motion, and more aesthetic. On the other hand the linear figures involve closure, are more evident of constraint in motion, and more functional. That the rural man sees himself in terms of the linear figures because of his unique relationship with the natural elements. His wife can identify with her urban cohorts because primarily as a homemaker she is sheltered somewhat from the elements, can find time to look at TV, read, and so forth. But her husband spends most of his working hours in the fields. It is he who feels the direct pressure of the natural forces. Care of crops minimizes any freedom of motion. His struggle with the elements requires that he use the properties suggested by the figures. Independent of preferences and values, the farmer is compelled to use his propositionality. He must be able to use and repair tools, and carry out innumerable technological tasks. Insofar as he is "boxed in" by natural forces, he must deal with his crops and stock like nature deals with him. On the level of values, "Luck" plays a highly significant role (83 percent); on the level of preferences, a degree of fatalism prevails (42 percent on

"Creativity"), and here on the level of use, a high degree of control is essential. It is almost that in light of the uncertainty of nature, the farmer must be ever more controlled in the use of his resources than a city dweller, who has much more opportunity for social interactions²⁸

In conclusion, to understand these data one must keep in mind the existence of the three theoretical levels: value, preference, and use. Without both the paradigm and the rural data, appreciation of the dimensionality of propositionality and appositionality would be lost. The urban data are strong in themselves, but the introduction of rural comparisons makes them more informative. The rural data have presented us with the paradoxical nature of the theory in that we now are made aware of the possibility of being confronted by a group that values both cognitive modes, and uses them both (rural women are highly appositional on use), while not taking a preferential stance on either mode. We have offered the tentative explanation that the answer to this problem lies in the difference of the rural man's fundamental life relationship--one of subdominance not in society but to nature--as opposed to the urban dweller's struggle with dominating social forces. The difference is thus one of a relationship between a man and his position within a dominance structure. Man vis-a-vis natural forces is thrown into a position of subdominance apart from social considerations. Within social structures (e.g., the blacks in the

urban milieu) an analogous situation may develop: a man may be thrown into a position of subdominance by generalized others. The tri-dimensional paradigm presented here allows for the analysis of instances of similarity between otherwise independent groups-- in this case, urban blacks and rural males.

VIII. COGNITIVE PERFORMANCES AND ACHIEVEMENT OUTCOMES

This final chapter relates cognitive performances to basic achievement outcomes. These outcomes consist of suitability for the educational system, socioeconomic status, and work alienation.

Grades in school measure of suitability for the educational system; in fact, they are one defining property. While it means a different thing to be a "C" student in a university than in a high school, control for school level had little impact on the data to be presented, and these comparisons are not included. The data in Table 24 show the percentages of persons in each race-sex group with "A" or "B" grades, by cognitive mode. The total figures reveal a consistent sex difference, with a higher percentage of females being "good students in every group. Comparisons by cognitive mode show that, in general, balanced and propositional types are the better student. This outcome indicates propositionality is more closely related to being a good student than is appositional performance. The same result is seen, with greater clarity, through comparisons of propositional and appositional types. For blacks, the differences are small, 5 percent in favor of the propositional types for females, and 4 percent in favor of the appositional types for males. For urban and rural whites, however, propositional types have better grades: the percent differences, propositional minus appositional, are urban white

Table 24

Percentages of Students With "A" or "B" Grades
in High School or College, by Cognitive Mode,
Location, Race, and Sex:
Urban Adult Samples

Cognitive Mode	Urban				Rural	
	Black Female	Black Male	White Female	White Male	Female	Male
Neither	57(37)	25(44)	59(22)	29(31)	0(2)	25(4)
Prop	55(47)	35(37)	73(125)	63(142)	75(4)	57(7)
App.	50(157)	39(115)	47(51)	35(80)	36(14)	33(24)
Balanced	58(40)	51(41)	73(101)	61(115)	75(4)	42(12)
Total	53(281)	38(237)	68(299)	53(368)	46(24)	38(47)

females 26, urban white males 28, rural females 39, and rural males 24. These pronounced differences support an argument developed in Chapter II, namely, that the educational system in the U.S. is directed to propositional performance, and that such performance on the part of students is rewarded.

The black-white difference might be explained as follows. While the educational system is set up to reward propositional minds, it is not set up to reward black people. Thus, a black student is not able to be defined as a good student even if he specialized in the propositional mode. For a propositional black student is still, after all, black.

A test by test analysis provides a view of the extent to which the various measures of performance are associated with academic achievement. Table 25A shows that Street Test performance has a weak positive association with good grades in three groups, but a negative association ($\gamma = -.23$) for black females, the group who scored highest on this test. While the negative result could be a statistical accident, it can be said that the data do not provide evidence that black female students are rewarded for developing this capability. Table 26A shows the Similarities Test is more highly associated with academic achievement than is the Street Test, with the highest association occurring among white females. Even stronger results are obtained from the WAIS Vocabulary Test (Table 27A; the associations are stronger for whites than for blacks, indicating whites are more rewarded for

their performances than are blacks. The results for the Vocabulary Test are comparable to those for the Index of Propositional Performance (Table 29A): again, the associations are twice as strong for whites than for blacks. The Raven Matrices Test (Table 28A) is found to be a weak direct predictor of good grades for the black and white males, but to be negatively associated for black and white females. Thus the data show that development of capability for categorical reasoning (Similarities) and vocabulary are the most predictive variables for academic achievement.

Perhaps a more direct measure of suitability for the educational system is the amount of education: for a college degree with "C" grades is nearly as marketable as is one with "B" or "A" grades. Table 30 shows the percentages of persons in all samples with "Some college." The rural white and Hopi samples contain small proportions of persons who have college educations, so that an analysis by cognitive type is not meaningful. Hence, our attention focusses on the urban samples. While about three-fourths of the whites report they have attended college, the values for blacks are slightly under one-half. There are no within-race sex differences for these total percentages. Examination of the table by cognitive mode indicates that the balanced type has the highest percent for black males, and that propositional types are highest for the other three groups. Thus, propositional performance is seen to be more

Table 30

Percentages of Respondents With Some
College Education, by Location, Sex,
Race, and Cognitive Type;
Adult Samples

Cognitive Type	Urban				Rural				Hopi	
	Black Female Pct. (N)	Black Male Pct. (N)	White Female Pct. (N)	White Male Pct. (N)	Female Pct. (N)	Male Pct. (N)	Female Pct. (N)	Male Pct. (N)	Female Pct. (N)	Male Pct. (N)
Neither	17 (35)	32 (44)	74 (19)	52 (27)	0 (2)	0 (7)	0 (1)	---	0 (1)	---
Propositional	83 (42)	56 (32)	90 (104)	80 (95)	25 (4)	0 (7)	---	---	---	---
Appositional	41 (151)	41 (111)	51 (151)	67 (73)	7 (15)	20 (25)	6 (16)	22 (19)	6 (16)	22 (19)
Balanced	65 (32)	73 (33)	84 (85)	55 (78)	0 (4)	23 (13)	67 (3)	50 (4)	67 (3)	50 (4)
Total Samples	48 (260)	46 (220)	79 (259)	75 (273)	8 (25)	15 (82)	15 (20)	26 (23)	15 (20)	26 (23)

highly related to college attendance than is appositional performance. This can also be seen in comparisons of the percentage differences, propositional minus appositional: the values are black females 42, black males 15, white females 49, and white males 13. Thus a propositional cognitive mode enhances one's chances of going to college. Further, this factor is far more intense for females than for males, as the percentage differences for females are about three times as great as the percentages for males.

Generally, the data pertaining to suitability for the educational system confirm the argument developed in Chapter II. Success in this system is increased somewhat by the possession of appositional skills, but is far more closely related to the possession of propositional skills.

Since educational attainment is prerequisite for the attainment of socioeconomic rewards, and since high socioeconomic status (SES) is a basic measure of success, parallel outcomes should occur for the SES variable. Table 31 shows the mean SES levels for the four urban groups (among rurals, SES takes on only two values, one for farmers and one for wives). The data shows that there are, for the four groups, virtually no differences in SES for the propositional and balanced cognitive modes; the appositional means, however, are higher than those from the neither category. This implies that both propositional and appositional performances are relevant for the attainment of

Table 31

Mean Scores of Socioeconomic Status (01-99), by
Cognitive Mode, Race, and Sex: Urban Adult Samples

Cognitive Mode	Black Female	Black Male	White Female	White Male
Neither	59.5(37)	50.5(46)	63.7(22)	69.2(32)
Prop.	68.2(47)	71.8(39)	74.1(128)	73.1(143)
App.	59.0(159)	56.8(114)	64.5(53)	62.5(81)
Balanced	66.1(40)	71.6(42)	74.3(101)	74.8(116)
Total	252.7(283)	250.6(241)	276.6(304)	279.6(372)

socioeconomic status, and that propositionality is the stronger variable. The mean differences, propositional minus appositional, are black females 8.8, black males 15.0, white females 9.6, and white males 10.6. These differences are large, and are comparable to the overall difference between blacks and whites, 8.1. Thus, the effect of cognitive mode is as great as is the effect of race.

It is also of interest to examine extreme cases for SES--those with high SES and those with low SES. Table 32 shows the percentages of respondents with SES scores of 90 through 99. The percentage differences, propositional minus appositional, are black females 4, black males 14, white females 7, and white males 22. It is interesting that these differences are far higher among males than among females. The data also suggest that the highest status positions in society are generally reserved for males: in both races, males are nearly twice as apt to have high status than are females.

Now let us look at persons who have attained only low SES, who are poor (SES 59 or lower). The differences obtained parallel those for the mean scores and the high scores. The percentage differences, propositional minus appositional, are black females -15, black males -21, white females -12, and white males -17. The sex differences are somewhat smaller here, and appositionality may be helpful in escaping poverty only among black males.

Table 32

Percentages of Persons Scored High (90-99)
on Socioeconomic Status, by Cognitive Mode,
Sex, and Race: Urban Adult Samples

Cognitive Mode	Black Female Pct.(N)	Black Male Pct.(N)	White Female Pct.(N)	White Male Pct.(N)
Neither	3(37)	7(46)	0(22)	9(32)
Propositional	8(47)	18(39)	15(128)	28(143)
Appositional	4(159)	4(114)	8(53)	6(81)
Balanced	8(40)	14(42)	17(101)	28(116)
Total	5(283)	9(241)	13(304)	23(372)

Finally, if an appositional cognitive mode is rewarded neither in the educational system nor in the economic system, we might expect respondents with appositional types to be more alienated from their jobs than are propositional types. An index of work alienation is constructed from five items.²⁹ Respondents expressing alienation on three or more items are scored "high" on work alienation. Table 34 shows that the race-sex groups, overall, differed little by level of work alienation: as argued in the last chapter, blacks are often happy to have any job at all, even if the content of the work is alienating. There is a tendency for the neither and appositional types to be alienated from their jobs, indicating that propositional performances are more compatible with most jobs. The percentage differences, propositional minus appositional, are black females 2, black males -15, white females -16, and white males -25. The obtained result is seen for three of four groups: the black females show less variability by cognitive mode than do the other three groups.

Implications.

No effort will be made to exhaustively review the implications of this research. The data presented in Chapter II and in this chapter certainly suggest that the American educational system and the economy reward propositional performances more than they do appositional performances. This poses a problem for society. For if appositional performance is as intricate and complex as is propositional thought, an "intelligence" in its own right,

Table 34

Percentages of Respondents Scored High (3-6) on
Work Alienation, by Cognitive Mode, Race and Sex: Adult Urban Samples

Cognitive Mode	Black Female	Black Male	White Female	White Male
Neither	40 (37)	40 (47)	45 (22)	50 (32)
Propositional	38 (48)	28 (39)	30 (129)	29 (143)
Appositional	36 (162)	43 (117)	46 (54)	54 (82)
Balanced	28 (40)	33 (42)	37 (102)	35 (117)
Total	36 (287)	38 (245)	36 (307)	38 (374)

then the relative lack of rewards for an appositional cognitive mode lacks justification. In fact, it is not difficult to imagine a mechanism by which the structure of rewards contributes to racism and sexism and the continuing oppression of subdominant social groups in American society. For example, blacks--due to independent cultural origins and denial of access to the resources of white society--do not develop propositional skills, but do develop appositional skills. The educational system then defines propositional performance as "intelligence" and concludes that blacks are mentally inferior and uneducable. On this basis, a rationale exists for allocating less money to the education of blacks; for it is an implicit value in our educational system that children differ in "native intelligence," and that the investment in a student should be directly proportional to his capability.

Hopefully, the research presented here will help undermine such racist thinking. First, there is no conclusive evidence that "intelligence" is heritable. Further, and there is more consensus on this point, there are two independent modes of cognitive performance, and the definition of one as "intelligence" represents a value judgment, and nothing more than that. For, from a logical point of view, it would make as much sense to say that appositional performance should be defined as intelligence, and to conclude that blacks are more intelligent than are whites.

Further, although no measure of "integrated" thought was used in this early investigation of the theory, it may be that integrated

thought constitutes a third level of cognitive functioning that is superior to a high level of specialization in either mode. That is, it may be true that two heads are better than one.

There exists abundant evidence that appositionally oriented strata of American society--blacks, women, and other subdominant categories, increasingly demand rewards for the kind of performance they carry out. Societal institutions have the capability to respond either negatively or positively to these demands. A negative response would involve sociopolitical repression. Positive responses could take either or both of two basic forms:

First, greater rewards could be allocated to appositional performances. As society becomes increasingly automated and labor increasingly capitalized, it is possible to imagine a reduced need for technological skills--for scientists, technicians, engineers, and the like. This will eventually create pressures toward a system of values less closely linked to performance in the economic system, and to a greater diversity of rewards for appositional performance. If this happens concurrently with political repression of New Age life styles, it is possible to imagine the people detaching themselves from involvement in societal institutions, and reorientation toward the appositional mode (perhaps even "balkanization") occurring.

Second, changes toward the inclusion of appositional learning processes, testing, appositional performances, and appositional contents, could eventually reduce cultural biases in the educational system. These outcomes are so closely related that they border

on identity with one another. For example, consider a history text on the Civil War. If the test questions pertain to dates, names, and places, then the student learns that these fragments of information define history, the content of the lesson. If, however, questions are global, referring to comprehension to the "How" and "Why" of it, then this level of analysis becomes history.

It is perhaps most efficient to refer to the problems of appositional contents at the level of testing. For descriptions of appositionally oriented teaching devices--such as open schools--are relevant to this research, but not a direct topic. Smith (1964) has systematically criticized the overemphasis on propositional (verbal) learning, and Cohen (1969) has carried out a program of research indicating that students whose cognitive mode differs from that of the system's definition are necessarily in a state of culture conflict. The reduction of such conflict, in the educational system and the society, is contingent upon a positive approach to restructuring rewards for the dual modes of thought.

FOOTNOTES

¹For a discussion of cerebral asymmetry, see von Bonin (1962) and Geschwind and Levinsky (1968).

²Language and speech is not entirely a left hemisphere function. There are two instances of persons who have left hemispherectomy who could speak a few words (Crockett and Estridge, 1951; Zollinger, 1935), and a third person who could understand speech and articulate long sentences while singing (Smith and Burklund, 1966; Smith, 1966, 1969).

³The term "left-brained" was used by Broca, who wrote: "We are right-handed because we are left-brained" (cited in Hertz, 1907, no page no. provided).

⁴For an extensive review of neurological and neuropsychological studies pertaining to hemispheric specialization, see Bogen (1969a, 1969b) and Bogen and Bogen (1919).

⁵See, e.g., Balthazar, Todd, and Morrison (1961), Benton (1968), Cohen et al. (1968), Costa and Vuaghn (1962), Reitan (1966), and Weinstein (1962).

⁶(1970, personal communication to Bogen) (Dr. Siegel?) of Colorado University has found that persons with damage to either cerebral hemisphere experience deficits on the Smith Symbol-Digit Modalities Test, in which abstract symbols are matched with positive integers. Capability to associate faces with names may thus similarly involve both hemispheres, and trans-collasal activity. Face recognition is undoubtedly a right hemisphere function (Hecaen and Angelergues, 1963, p.132; Hecaen, 1962), and number recognition a left-hemisphere function (Kimura, 1964). Thus this performance involves the integration of appositional and propositional thought, indicating the analogy between Jensen's Level I and Level II modes of thought and the appositional-propositional distinction may be, at best, incomplete.

⁷Levi-Strauss, in The Raw and the Cooked (1964), suggests that the structural analysis of myth "...cannot be carried out according to the Cartesian principle of breaking down the difficulty into as many parts as may be necessary for finding the solution." (p.5) Further, he develops an appositional methodology for the analysis of myth which, he contends, is isomorphic to the structure of music, a cognitive activity which is shown by the neurological studies to be lateralized

in the right cerebral hemisphere.

⁸See Milner, 1962, 1964, 1968; Corkin, 1965; Kimura, 1963, 1966, 1967; Kimura and Folb, 1968; Shandweiler, 1966.

⁹See Bogen and Vogel, 1962; Bogen, Fisher, and Vogel, 1965; Bogen, Sperry, and Vogel, 1969.

¹⁰Wyke and Ettlinger, 1961.

¹¹Heron, 1957; Mishkin and Forgays, 1952.

¹²Bryden, 1960.

¹³Heron, 1957; Terrace, 1959.

¹⁴Powell, 1962.

¹⁵It is commonplace in American society for non-propositional thinking to be devalued. Roszak's (1969) comments on this point merit quotation:

As the spell of scientific or quasi-scientific thought has spread in our culture...the marked tendency has been to consign whatever is not available in the waking consciousness for empirical or mathematical manipulation, to a purely negative catch-all category (in effect, the cultural garbage can) called the "unconscious"...or the "irrational"...or the "mystical"...or the purely subjective." Conversely, behavior that is normal, valuable, productive, mentally healthy, socially respectable, intellectually defensible, sane, decent, and practical is supposed to have nothing to do with subjectivity. When we tell one another to "be reasonable", to "talk sense",...we mean that one should...look at the world rather in the way an engineer looks at a construction project or a physicist views the behavior of atomic particles. (pp. 52-53)

Rozak's description of thought, coordinate with "empirical or mathematical manipulation", clearly designates the propositional mode. He describes effectively some concepts employed in categorizing its non-propositional complement. It is emphasized that the appositional mode is not equivalent to the non-propositional, nor is propositional thought equivalent to non-propositional. The "unconscious" and the "irrational" may not be localized in a single hemisphere.

¹⁶At the social level, McLuhan (1968) writes that "Mechanical, industrial or hardware service environments...are tightly tied together as bureaucratic organizations. On the other

hand, software environments of information are pervasive, unobtrusive and as decentralized as telephone or radio. Hardware is specialized, requiring much fragmentation of skills. Software is generalized, requiring an interrelated awareness of whole environments." These meanings of hard and soft information correspond to propositional and appositional information processing.

17For studies on the development of modern technological society relevant to the arguments developed here, see Roszak (1969), Ellul (1964), Galbraith (1967), McLuhan (1964), Seidenberg (1950), and Wilkenson (1967)

18This writer would hesitate to concur with McLuhan that the balance between sensory inputs is central to a linear or nonlinear social organization. For both eyes and ears input stimuli to both cerebral hemispheres; further, both visual and auditory stimuli can vary radically in the extent to which their content is linear or nonlinear. The basic societal commitment to define information as that which is compatible with the processes of one cerebral hemispheres may be a more reasonable physiological description.

19Barbar Williams of Vassar College (personal communication) has suggested that vigilance and succoring may be psychological dimensions of appositionality. From this, Diana TenHouten (personal communication) has hypothesized that--since vigilance and succoring are necessary for subdominant groups in any society, even in appositionally oriented societies, subdominant groups will be appositional. In an appositional society, or sphere of society, the theory predicts that subdominant groups will carry out (devalued) propositional functions. From this, it follows that in our rural Michigan sample, in which the society is appositional but females are subdominant, that the females would be relatively less appositional than the men:

20The investigation of the seeds of propositionality in pre-modern societies is a topic that has received far more attention, as it pertains to the past. That societies may, as they become technocratic, in turn experience reorientation toward appositionality by no means a cyclical theory of social change. For pre- and post- industrial societies may share an appositional cognitive style to some extent, but they are, on balance, radically different.

21The enery of Ch'ien (the yang line hexagram) is represented as "...unrestricted by any fixed condition in space and is therefore conceived of as motion. Time is regarded as the basis of this motion. Thus the hexagram includes the power of time and the power of persistence in time, that is, duration." (Wilhelm, 1950, p.3) Here a parallel exists with the functions

of the left hemisphere. Bogen contends that the consideration of time is present in, and only in, the left hemisphere. He adds that consideration of time may be the distinguishing feature of the left hemisphere. And, of course, it is known that spatial imagination (face recognition, visuoconstructive ability...) is lateralized in the right hemisphere. This too is consistent with the I Ching, as this hexagram is viewed as "unrestricted by...fixed conditions in space."

In the human world, the attributes of Ch'ien denotes the "...creative activity of the holy man or sage, or the rule of leaders of men, who through his power awakens and develops their highest nature." (Wilhelm, 1950, p.3) This concept of achievement, or furthering, pervades the discussion of this hexagram. In describing this hexagram, we are told: "Because the great man...sees with great clarity causes and effects, he completes the six steps at the right time and mounts toward heaven on them at the right time, as though on six dragons." (Wilhelm, 1950, p.4) Thus each step becomes a preparation for the next; time is no longer a hinderance, but rather a means of making actual what is potential.

The concept of power associated with the first hexagram implies an ordering of persons, according to which some are more powerful than are others. Thus, law, order, and the political process exist primary in a context of propositionality. This is coordinate with the original meaning of yang, "banner waving in the sun". In the description of Ch'ien, it is written that "...the great man brings peace and security of the world through his activities creating order." (Wilhelm, 1950, p.5)

In contrast, the hexagram consisting on yin lines, Kun, is described as independent of time, and space is its essential property. Again, this corresponds with the appositional mind and its capacity for spatial thought.

In the Seventh Wing of the I Ching, it is written that the first hexagram (Ch'ien) "...furthers by virtue of what eternally belongs to it, by virtue of its very nature...In the phenomenal world, each thing has its specific nature: this is the principle of individuation. At the same time this specific nature fixes a boundary that separates each individual from every other." (Wilhelm, 1950, p.378) Thus Ch'ien is seen as substructing phenomena, separating individuals from their environment and each other. Clearly, the concept of ego, which has developed hand-in-hand with the technological, fragmentation of society, is a left hemisphere phenomena. The yin hexagram, Kun, by contrast, is unifying and constructive, and contains no principle of individuation.

²²This section was developed as a result of conversations with Charles Kaplan, who has been much involved in the theory at the linguistic level.

²³ If a society is primarily egalitarian, and neither sex subdominant, then no differences in propositionality and appositionality should occur if the second and third components.

²⁴ Each occupation in the U.S. Census Bureau's Special Occupation Codes was coded independently by two persons, according to whether the content of the job should be primarily propositional, linear and verbal, or appositional, non-linear, and non-verbal. A job is considered non-classifiable otherwise, due to disagreement or agreement that the occupation's content is neither appositional nor propositional. In the coding of these occupations, there was a high level of consensus for higher SES categories, which decreased for lower SES categories.

²⁵ A factor analysis was run for three factors. The third factor attracted only the first three items from the Similarities Test, and explained almost no variance. This does not imply that there are not three factors. There may exist a third level of cognition, which can be called integrated thought, and inter-hemispheric cooperation between the two hemispheres of the brain, via the integrative functioning of the corpus callosum (Bogen and Gazzaniga, 1965).

²⁶ This can also be seen in the data in Table 21A. Here, the rural male farmers are as apt to believe certain people possess ESP and get premonitions as are the other sub-groups, yet they are less apt to act on them. 23 percent of the farmers would act on a premonition, compared to 35 percent of farmer's wives; the values in the urban samples range from 54 to 62. Additionally, the male farmers, while as apt to believe in the existence of ESP and to experience premonitions, are not apt to define these phenomena as supernatural (23 percent, compared to 35 percent for farmer's wives). These values are comparable to urban blacks, and lower than those for urban whites.

²⁷ In this sense, the linear figures are concrete and the nonlinear figures abstract; also, the linear figures are more nearly conceptual, as opposed to perceptual, i.e., the linear figures "look like something". In view of this, the process of identifying linear figures as propositional on the ground that propositional though involves step-by-step (linear) procedures becomes ambiguous.

²⁸ The rural white farmers were the least apt to report that "Your feelings are your best guide". (See Table 35A.)

²⁹ The items are: 1. I don't really feel a sense of pride or accomplishment as a result of the type of work that I do; 2. My work gives me a feeling of pride in having done the job well; 3. I very much like the type of work that I am doing;

(continued)

4. My job gives me a chance to do the things I do best; 5. My work is my most rewarding experience. High alienation is measured by agreement with item 1 and disagreement with the other four.

APPENDIX A: TABLES

Table 2A

Complete List of Occupations Defined As
Appositional, Propositional or Not Classifiable,
by Socioeconomic Level (SES):
Urban Occupational Sample

SES	Appositional	Propositional	Not Classifiable
90- 99	Writers	Physicians,	Advertising
	Literature	Surgeons	Executives
	Professors	Economists	Anthropologists
	Architects	Scientists	Sociologists
	Editors	Pharmacists	Assistant Buyers
	TV Writers	Lawyers	Interviewers
	Poets	Cost Analysts	Purchasing Agents
	Fine Arts	Radio Operators	Employment
	Professors	Dentists	Counselors
	Copy Writers	Engineers	Psychologists
	Architectural	Accountants	Advertising Agents
	Designers	Psychiatrists	Trouble Dispatchers
	Public Relations	Bankers	Director-Educational
	Agents	Math Professors	Opportunity Program
	Film Editors	Science Professors	Personnel
	Graphic Designers	Veterinarians	Administration
	Interior Designers	Chemists	Radio Producer
	Designers (dress)	Radarmen	Vice President--
	Publicists	Management	Radio Station
	Screenwriters	Consultants	Radio Program
			Director
80- 89	Artists	Secretaries	Social Workers
	Art Teachers	Stenographers	School Directors
	English Teachers	Real Estate	Public Utilities
	(High School)	Brokers	Superintendents
	Actors, Actresses	Math Teachers	Business Managers
	Directors	Science Teachers	(not specified)
	Reading	Insurance	Antique Dealers
	Consultants	Adjusters	Assistant Managers
	Film Producers	Draftsmen	(general businesses)
	Astrologers	Programmers	Mailmen
	Tarot Card Readers	Computer Systems	Translators
	Magicians	Analysts	Teachers (all other
	TV Producers	Technicians	areas including
	Film Producers	Administrative	elementary)
	Inventors	Assistants	Recreation Leaders
	Cartoonists	Radio Technicians	Mental Health Workers
	Movie Directors	Movie Technicians	Supervisor-Hospital
	Nursery School	Physical	Volunteers
	Teachers	Therapists	Boutique Owners
	Witches, Warlocks	Typists	Research Assistants
		Builders	Youth Directors
			High School Counselors
			Probation Officers

Table 2A (con't)

SES	Appositional	Propositional	Not Classifiable
70- 79	Photographers Musicians Music Teachers Film Projectionists Film Technicians (photographers) Singers Song Writers Choir Directors Ship Officers (skippers) Milliners Organists	Electricians Policemen(public) Navigators Detectives(public) Medical Technicians Dental Technicians Bookkeepers Surveyors Aircraft Technicians Anesthetists Medical Corpsmen Nurses Clerks(general office work) Telephone Operators Printers Dye Lot Inspectors Data Processors Airplane Mechanics Telephone Repairmen Tool & Die Makers Steelmill Foremen Construction Contractors Receptionists	Firemen Production Control Workers Pool Hall Owners Record Store Managers Businessmen (not specified) Grocery Store Managers Managers--Import- Export Postal Workers Managers--Dry Cleaners Inspectors
60- 69	Decorators General Craftsmen Silversmiths Leather Craftsmen Candlemakers Sandlemakers Jewelers Needlepoint Craftsmen Framemakers Dancers Dance Teachers Clergymen Missionaries Ministers Auto Racers Professional Athletes Cosmetic Demonstrators Professional Skaters	Machinists Plumbers Radio Mechanics TV Mechanics Aircraft Assemblers Assemblyline Workers Auto Assemblers Cashiers Deputy Sheriffs Private Investigators Ticket Machine Operators Electrical Assemblers Film Technicians (processors) PBX Operators Keypunch Operators Dieticians Coders IBM Operators Computer Operators Pipe Fitters, Welders	Airline Ticket Agents Salesmen (not specified) Librarians Military Servicemen Car Salesmen Bus Drivers Hospital Housekeepers

Table 2A (con't)

SES	Appositional	Propositional	Not Classified
59 or less	Models	Blacksmiths	Truck Drivers
	Seamen	Gas Station	Babysitters
	Sailors	Attendants	Food Service
	Deckhands	Mortuary Attendants	Workers
	Entertainers	Machinery Operators	Exterminators
	Gardeners	(general)	Messengers
	Cooks	Nursing Aides	Teachers Aides
	Carpenters	Maintenance Workers	Custodians
	Hair Dressers	Auto Mechanics	Janitors
	Cosmetologists	(repairmen)	Maids
	Seamstresses	Clerks (shipping)	Housekeepers
	Dressmakers	Toolcrib Attendants	(private)
	Fishermen	Warehousemen	Hotel Maids
	Barbers	Enginemen	Cab Drivers
	Walters	Gunner's Mates	Housewives
	Waitresses	Printer's	
	Tailors	Assistants	
	Bakers	Security Guards	
	Barmaids	Masons	
		House Painters	
		General Operatives	
		Practical Nurses	
		Medical Assistants	
		Cannery Workers	
		Pharmaceutical	
		Assistants	
		Sewer Cleaners	
		Drillpress Operators	
		Construction Workers	

Table 3A

Percentage of Respondents in Three Age Groups,
by Race and Sex: Urban Adult Residential Samples

Age Group	Black Female	Black Male	White Female	White Male	Total
17-29	52	57	71	54	58
30-49	39	36	25	35	34
50-98	9	7	4	11	8
Total Percent	100	100	100	100	100
Number	(90)	(55)	(56)	(57)	(258)

Table 8A

Percentage of Respondents in Appositional,
Propositional, or Non Classifiable Jobs:
Urban Adult Residential Sample

Classification	Black Female	Black Male	White Female	White Male	Total
Appositional	21	12	31	35	24
Propositional	37	47	43	41	41
Not Classifiable	42	41	26	24	35
Total Percent	100	100	100	100	100
Number	(87)	(51)	(49)	(51)	(238)

Table 9A

Percentages of Respondents in Each of Five
Occupational Status Levels, by Race-Sex Group
and Occupational Classification: Urban Adult Samples

Race Sex Group	Socio Economic Status	Occupational Classification		
		Propositional	Appositional	Neither
Black Female	90-99	7	8	4
	80-89	25	7	40
	70-79	38	17	5
	60-69	19	15	10
	1-59	11	53	41
Total percent		100	100	100
Number		(126)	(60)	(90)
Black Male	90-99	11	7	7
	80-89	10	15	25
	70-79	21	21	7
	60-69	29	26	24
	1-59	29	31	37
Total percent		100	100	100
Number		(123)	(88)	(59)
White Female	90-99	9	22	11
	80-89	31	25	62
	70-79	37	17	3
	60-69	13	8	6
	1-59	10	28	18
Total percent		100	100	100
Number		(138)	(90)	(65)
White Male	90-99	29	20	8
	80-89	19	24	51
	70-79	22	20	9
	60-69	9	12	18
	1-59	21	24	14
Total percent		100	100	100
Number		(183)	(115)	(78)

Table 13A

Percentage Distributions of Scores on the Index
Of Propositional Performance (0-30), by Location,
Race and Sex: Urban Adult Samples

Scores	Urban				Rural	
	Black Female	Black Male	White Female	White Male	Female	Male
29-30	0	0	1	1	0	0
27-28	0	0	1	2	0	0
25-26	0	1	6	7	0	0
23-24	2	1	13	11	4	0
21-22	5	1	17	14	4	15
19-20	12	11	21	19	18	17
17-18	20	20	18	19	44	22
15-16	18	20	11	15	18	13
13-14	22	21	8	9	7	24
11-12	15	17	3	3	0	9
9-10	6	6	1	0	0	0
7-8	0	2	0	0	4	0
Total percent	100	100	100	100	99	100
Number	(279)	(245)	(307)	(375)	(27)	(53)

Table 14A

Percentage Distributions of Scores on the
Street Gestalt Completion Test (an Index of Ap-
positional Performance), by Location, Race, and Sex:
Urban Adult Samples

Score	Urban				Rural		Hopi	
	Black Female	Black Male	White Female	White Male	Female	Male	Female	Male
12	0	1	1	1	0	0	13	12
11	6	3	1	2	8	2	9	12
10	8	3	6	5	8	17	17	15
9	14	12	8	11	19	11	17	34
8	15	13	15	14	27	21	35	19
7	17	21	18	19	15	15	9	4
6	16	18	21	21	8	11	0	0
5	14	17	16	13	12	11	0	4
4	9	8	10	6	4	2	0	0
3	1	3	3	6	0	10	0	0
2	0	1	1	1	0	0	0	0
1	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0
Total percent	100	100	100	100	100	100	100	100
Number	(287)	(245)	(307)	(374)	(27)	(54)	(23)	(26)

Table 20A

Percentages of Respondents Endorsing Selected
Items, by Location, Sex, and Race: Adult Samples

Item	Urban				Rural	
	Black Female	Black Male	White Female	White Male	Female	Male
Watch TV 3 hours or more per week	62	49	24	19	44	18
Go to Movies	72	76	85	84	41	45
Collect anything	60	50	24	35		
An artistic person (definitely yes)	37	40	42	49	22	14
Has pet peeves	66	50	45	42	72	66
Does things right away	81	83	69	68	61	59
Continues reading when sees a new word	52	70	27	36	42	49
Keeps in touch by phone	61	60	63	80	50	60
Expresses self through talking	51	77	71	77	62	66
Job is a career	25	92	48	48	55	58
Rather have another job	21	21	57	57	55	62
*Number	(287)	(295)	(307)	(374)	(27)	(54)

*There are small variations in the numbers of respondents answering each item, not reported here.

Table 21A

Percentage of Respondents Endorsing Selected Items
on Appositional Wisdom, by Location, Race, and
Sex: Adult Samples

	Urban				Rural	
	Black Female	Black Male	White Female	White Male	Female	Male
Certain people have ESP	90	82	90	84	86	73
Gets premonitions	80	71	74	73	63	70
Acts on premonitions	55	54	62	56	35	23
Has supernatural ex- periences	33	34	50	46	35	23
Number	(287)	(245)	(307)	(374)	(26)	(53)

Table 23A

Mean Scores on Linearity of Figure Identification
With Self, by Cognitive Mode, Location, Race, and
Sex: Adult Samples

Cognitive Mode	Urban				Rural	
	Black Female Mean(N)	Black Male Mean(N)	White Females Mean(N)	White Males Mean(N)	Female Mean(N)	Male Mean(N)
Neither	2.6(37)	2.8(47)	2.0(22)	2.2(32)	1.0(2)	5.6(7)
Propositional	2.4(48)	3.4(39)	1.9(12)	2.7(143)	3.5(4)	4.4(8)
Appositional	3.2(162)	3.2(117)	2.1(54)	2.3(82)	1.9(17)	4.5(26)
Balanced	2.4(40)	3.0(42)	1.9(102)	2.8(117)	3.8(4)	4.6(14)
Total	2.9(287)	3.1(245)	2.0(307)	2.6(374)	2.3(27)	4.6(55)

Table 25A

Percentages of Students with "A" or "B" Grades in
High School or College, by Mean Performance
on the Street Gestalt Completion Test,
By Race and Sex: Urban Adult Samples

Street Performance

Race-sex group	Low(0-5) Pct.(N)	Med.(6-7) Pct.(N)	High(8-12) Pct.(N)	Gamma
Black female	59 (59)	53 (91)	54 (121)	-.23
Black male	28 (66)	35 (90)	48 (79)	.26
White female	67 (86)	65 (119)	71 (94)	.05
White male	36 (98)	60 (147)	50 (122)	.13

Table 26A

Percentages of Students with "A" or "B" Grades in
High School or College, by Mean Performance
on the WAIS Similarities Test, by Race
and Sex: Urban Adult Samples

Similarities Performance

Race-sex group	Low(0-5) Pct.(N)	Med.(6-7) Pct.(N)	High(8-12) Pct.(N)	Gamma
Black female	43(127)	58(118)	66(35)	.23
Black male	31(97)	30(99)	46(39)	.21
White female	50(42)	64(123)	77(133)	.34
White male	51(70)	45(156)	63(142)	.20

Table 27A

Percentages of Students with "A" or "B" Grades in
 High School or College, by Mean Performance
 on a Subset of the WAIS Vocabulary
 Test, by Race and Sex: Urban
 Adult Sample

Race-sex group	<u>Vocabulary Performance</u>			Gamma
	Low(0-5)	Med.(6-7)	High(8-12)	
Black female	50(123)	54(122)	71(28)	.17
Black male	30(110)	43(101)	45(20)	.23
White female	43(37)	60(109)	79(149)	.46
White male	28(50)	44(167)	71(149)	.53

Table 28A

Percentages of Students with "A" or "B" Grades in
High School or College, by Mean Performance
on the Raven Matrices Test by Race and
Sex: Urban Adult Samples

Raven Performance

Race-sex group	Low(0-5) Pct.(N)	Med.(6-7) Pct.(N)	High(8-12) Pct.(N)	Gamma
Black female	59(102)	49(78)	51(41)	-.117
Black male	35(111)	35(63)	44(27)	.078
White female	63(108)	71(75)	52(129)	-.178
White male	47(115)	50(103)	62(129)	.208

Table 29A

Percentages of Students With "A" or "B" Grades in
High School or College, by Performance on the Index of
Propositional Performance, by Race and Sex:
Urban Adult Sample

Race-sex group	<u>Propositional Performance</u>			Gamma
	Low(0-16) Pct.(N)	Med.(17-19) Pct.(N)	High(20-30) Pct.(N)	
Black female	47(152)	61(81)	58(45)	.21
Black male	32(132)	47(73)	43(32)	.18
White female	53(55)	64(76)	79(168)	.44
White male	30(76)	50(110)	65(182)	.58

Table 35A

Percentages of Respondents Disagreeing That "Your
Feeling Are Your Best Guide", by Cognitive Mode,
Location, Race and Sex: Adult Samples

Cognitive Mode	Urban				Rural	
	Black Female Pct(N)	Black Male Pct(N)	White Female Pct(N)	White Male Pct(N)	Female Pct(N)	Male Pct(N)
Neither	43(37)	43(47)	36(22)	43(32)	----	14(7)
Propositional	50(48)	46(34)	39(129)	52(143)	33(3)	29(7)
Appositional	52(162)	52(115)	43(54)	33(81)	40(15)	9(22)
Balanced	58(40)	64(42)	39(101)	46(117)	50(4)	36(14)
Total	51(287)	51(243)	39(306)	45(373)	40(22)	20(50)

APPENDIX B: THE ADULT QUESTIONNAIRE

A NATIONAL STUDY OF THOUGHT AND OPPORTUNITY

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Department of Sociology
TransCentury Corporation

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Hello, I'm _____ from TransCentury Corporation. We're working with the University of California on a national study and we'd like to interview you. This study is being carried out in different parts of the country to test a new idea about what parts of the brain people use. You have been selected in a scientific sample to represent yourself and thousands of people like you. You do not have to give your name. No one but the study staff will ever see your answers.

First, I am going to ask you some questions about your medical background. We need to know about this before we can start the interview.

1. I need to know if you have ever had a head injury?

Yes 1
No 2 (SKIP TO 5)
1:10

2. Were you unconscious?

Yes 1
No 2 (SKIP TO 4)
1:11

3. How long were you unconscious?

Momentarily 1
Less than one hour . . . 2
Over one hour 3

(IF OVER ONE HOUR, TERMINATE INTERVIEW) 1:12

4. Did you have to go to the hospital?

Yes 1
No 2 (SKIP TO 5)
1:13

(IF YES, ASK) How long were you in the hospital for this injury?

Less than one day 1
More than one day 2 1:14

(IF MORE THAN ONE DAY, TERMINATE INTERVIEW)

5. Have you ever had a stroke?

Yes 1
No 2 (SKIP TO 6)
1:15

(IF YES) How long did it last?

Less than one day . . . 1
More than one day . . . 2 1:16

(IF MORE THAN ONE DAY, TERMINATE INTERVIEW.)

IF MUST TERMINATE, SAY:

I am sorry but since you have had a head injury (OR STROKE) we cannot use you for this interview. It is just a precaution on our part. But thank you for taking the time to answer these questions for us.

(NOTE: IF MUST DISQUALIFY, RECORD NUMBER OF ITEMS THAT DISQUALIFY RESPONDENT. KEEP TRACK OF NUMBER OF PEOPLE THAT YOU DISQUALIFY.)

6. How old are you? _____ 1:17-18

7. Do you have children?

Yes 1
No 2 1:19

(IF YES) How many? _____ 1:20-21

8. Where did you grow up. (READ CHOICES)

On a farm. 1
In a small town. 2
In a suburban area 3
In a city 4
Combination of farm and small town 5
Combination of farm and city or suburb 6
Combination of small town, suburb and/or city. 7
Combination of suburb and city 8

1:22

9. How old were you the first time you saw a television program?

1:24-25

10. Do you watch television now?

Yes 1
No 2
Sometimes . . . 3 1:26

11. How much is your T.V. usually on whether or not you are watching it? (READ CHOICES)

Most of the day and evening . . 1
Most evenings 2
Only for certain shows 3 1:27

12. On an average, how many hours do you watch T.V.?
(READ CHOICES)

1 to 2 hours weekly 1
2 to 6 hours weekly 2
1 to 2 hours each day 3
3 to 4 hours each day 4
5 or more hours each day 5
Don't Know 8 1:28

13. What kinds of programs do you prefer?

14. Do you go to the movies?

Yes 1
No 2 (SKIP TO 17)
1:29

15. About how often?

Less than once a month 1
From 1 to 3 times a month . . . 2
Once a week or more 3 1:30

16. What kinds of movies do you like?

17. What do you depend on most to keep you informed of the news? (READ CHOICES)

Newspaper	1	
Television	2	
Radio	3	
Magazines	4	
Friends	5	
Combination of TV & newspaper .	6	
Combination of radio & friends.	7	
Combination not including TV .	1	1:31-32

18. What kinds of things do you do with your spare time, like your hobbies, sport activities, social life, things like that? (PROBE FOR COMPLETE RESPONSE)

19. Do you collect anything like coins or stamps?
(NOTE IF USED TO)

Have you ever collected anything? (NOTE IF AS CHILD)

20. Do you ever work crossword puzzles?

Yes	1	
No	2	1:33

21. Do you consider yourself an artistic person?

Definitely	1	
Somewhat	2	
Not at all	3	
Don't Know	8	1:34

(NOTE COMMENTS)

22. Do you play a musical instrument?

Yes 1
No 2 (SKIP TO 24)

1:35

23. Do you play by ear?

Yes 1
No 2 1:36

24. Do you enjoy singing?

Yes 1
No 2 1:37

25. Do you like to dance?

Yes 1
No 2 1:38

26. I'm going to read a list of words; please tell me which ones describe today's rock music?

soothing	_____	1:39
racket	_____	1:41
meaningful	_____	1:42
vulgar	_____	1:43
entertaining	_____	1:44
confused	_____	1:45
revolutionary	_____	1:46
subversive	_____	1:47
irritating	_____	1:48
moving	_____	1:49
true	_____	1:50
lyrical	_____	1:51

27. Are you mechanical

Yes 1
No 2
Don't Know . 8 1:52

28. Are you right or left handed?

Right 1
Left 2
Ambidextrous 3 1:53

29. Is that the hand you write with?

Yes 1 (SKIP TO 30)
No 2 1:54

(IF NOT) Which one do you use for writing?

Right 1
Left 2 1:55

30. Do you do anything better with your (right/left) (SAY
OPPOSITE) hand?

Yes 1
No 2 1:56

(IF YES) What is that?

31. Have you always been (right/left/ambidextrous) handed?

Yes 1
No 2
Don't Know . 8 1:57

(IF NO) Explain?

32. Did you ever stutter when you were young?

Yes 1
No 2
Don't Know . 8 1:58

Next, I am going to show you a series of pictures and I would like you to tell me what it is you see in each picture. There is no time limit and so you can take your time in deciding what it is you see. You can use just a word or a phrase to describe what you see. I will show you some examples to give you an idea of what it is we want you to do.

(INTERVIEWER: GIVE R. EVERY OPPORTUNITY TO PERCEIVE EACH PICTURE. ASK HIM SIMPLY TO TELL WHAT IT IS HE SEES. HOLD EACH ITEM AT VARIOUS ANGLES - CHANGE THE DISTANCE OF THE PICTURE FROM TWO TO TEN FEET - THE RECEDING OR APPROACHING MOVEMENT OFTEN TENDS TO BRING THE FIGURE INTO RELIEF. IF THE FIGURE DOES NOT EMERGE WITHIN A REASONABLE TIME - AND THE R. IS PERSISTENT, TURN TO THE NEXT ITEM. THE LAST RESPONSE GIVEN BY R. IS THE ONE ACCEPTED.)

Next, I want you to look at a card with some figures on it.

(SHOW CARD 1 to R. FOR 5 SECONDS - THEN PUT CARD FACE DOWN.)

Now will you try to draw one of the figures as best you can.
Draw whichever one you remember best.

(AFTER R. HAS DRAWN A FIGURE, SHOW CARD AGAIN).

1. Which one did you draw?

Top	1
Middle	2
Bottom	3 2:10

2. Why did you choose it?

Easiest	1
Hardest	2
Liked it	3
Other	4
Don't Know . .	8 2:11

3. Which one did you like the best?

Top	1
Middle	2
Bottom	3 2:12

Alright, now will you look at this card.

(SHOW CARD 2 FOR 5 SECONDS, THEN PUT CARD FACE DOWN.)

Again, will you draw the one you remember best.

(AFTER R. DRAWS FIGURE, SHOW CARD 2 AGAIN.)

4. Which one did you draw?

Top	1
Middle	2
Bottom	3 2:13

5. Why did you choose it?

Easiest	1
Hardest	2
Liked it	3
Other	4
Don't Know . .	8 2:14

6. Which one did you like this time?

Top	1
Middle	2
Bottom	3 2:15

On this page, you are asked to decide just whether you like or don't like each of the drawings. Record your answers by each drawing by making a "L" for Like of a "D" for Don't Like. If you can't decide, guess. Don't skip any drawings. Try to work as fast as you can.

Next, I'm going to ask you to use each of the following words in a sentence.

1. breakfast
2. conceal
3. regulate
4. designate
5. obstruct
6. reluctant
7. edifice
8. audacious
9. plagiarize
10. travesty

The purpose of the next questions is to see how you think certain words are alike. I am going to name two things which are the same or alike in certain ways and I want you to tell me in what ways they are alike, FOR Example: "In what way are an orange and a banana the same? (PAUSE) (IF R. ANSWERS WITH THE REPLY "They are fruits" SAY "that is right," AND PROCEED WITH THE LIST. IF HIS RESPONSE IS "They are not alike", THE EXAMINER ADDS, "They are alike in some ways: tell me one way in which they are alike." IF SUBJECT FAILS TO ANSWER WITHIN 10 to 15 seconds, EXPRESSES A DIFFERENCE OR GIVES AN INFERIOR REPLY, THE EXAMINER SAYS, "Well you might say you can eat them both, or that they both have skins, or that they are both fruits." THEN PROCEED WITH THE LIST AS GIVEN. CONTINUE UNTIL FOUR SUCCESSIVE PAIRS ARE COMPLETELY FAILED. RECORD ANSWERS VERBATIM. THE FOLLOWING IS THE LIST OF SIMILARITIES TO BE READ:

- | | |
|----------------|------------|
| 1. Orange | Banana |
| 2. Coat | Dress |
| 3. Dog | Lion |
| 4. Wagon | Bicycle |
| 5. Daily paper | Radio |
| 6. Air | Water |
| 7. Wood | Alcohol |
| 8. Eye | Ear |
| 9. Egg | Seed |
| 10. Poem | Statue |
| 11. Praise | Punishment |
| 12. Fly | Tree |

SIMILARITIES	SCORE 3, 2 or 1	
1. Orange - Banana		2:24
2. Coat - Dress		2:25
3. Dog - Lion		2:26
4. Wagon - Bicycle		2:27
5. Daily Paper - Radio		2:28
6. Air - Water		2:29
7. Wood - Alcohol		2:30
8. Eye - Ear		2:31
9. Egg - Seed		2:32
10. Poem - Statue		2:33
11. Praise - Punishment		2:34
12. Fly - Tree		2:35

33. Do you keep close track of how much money you have either in your pocket or in the bank?

Yes 1
No 2
Don't Know . 8 2:36

34. Do you think there's anything to astrology?

Yes 1
No 2
Don't Know . 8 2:37

35. Do you think there's anything to women's intuition?

Yes 1
No 2
Don't Know . 8 2:38

36. Are women more intelligent in some things than men?

Yes 1
No 2
Don't Know . 8 2:39

37. Do you think there are any general type differences in the way men and women look at the world?

Yes 1
No 2
Don't Know . 8 2:41

38. Do you believe that certain people have extra-sensory perception or ESP?

Yes 1
No 2
Don't Know . 8 2:42

39. Do you ever get premonitions about things?

Yes 1
No 2 2:43

40. Have you ever acted on a premonition?

Yes 1
No 2 2:44

41. Have you ever had any kind of supernatural or extraordinary experience?

Yes 1
No 2 2:45

(IF YES) What was that? (PROBE FOR WHICHEVER ONE STANDS OUT MOST OR THE LAST ONE THEY HAD.)

Next, we'd like you to make a copy of this drawing with your left hand.

On this page are some abstract symbols, in groups of three each. Would you look at each set of three and select one which is most representative of yourself. Then pick another which is least representative of yourself. Print an "M" by that figure which is most like yourself, and an "L" by the figure which is least like yourself.

Would you look at each set of three and this time, assign one as male, using a "M" and another as female, using a "F".

On this page is another series of abstract figures, again in sets of three. We would like you to assign one in each set as Black with a "B" and one as White, using a "W".

On the next pages are sets of five abstract figures. This time we would like you to select one to represent Air and another to represent Water. Mark the one you choose as Air with an "A" and the one you choose as Water with a "W".

42. There's a lot of talk in the U.S. today about "being a success", but it means different things to different people. What does being a success mean to you?
(PROBE FOR COMPLETE RESPONSE)
-

43. In order to be successful, which of the following do you think a person must be?

consistent	_____	3:14
organized	_____	3:15
educated	_____	3:16
decisive	_____	3:17
cooperative	_____	3:18
moral	_____	3:19
lucky	_____	3:20
creative	_____	3:21
a leader	_____	3:22
competitive	_____	3:23
perceptive	_____	3:24
intelligent	_____	3:25

44. If you could change your life in any way, what changes would you make? (PROBE FOR COMPLETE RESPONSE)

-
45. When you consider all of the problems in the U.S. today (PAUSE) which one do you feel is the most pressing? (PROBE FOR COMPLETE RESPONSE)

I am going to show you a series of colored designs. Each time I show you one of these designs, I want you to describe the over-all pattern that you see in it. After you examine each design, I will show you a simpler figure, which is contained in that larger design. You will then be given the larger design again, and your job will be to locate the smaller figure in it. Let us go through one to show you how it is done.

(SHOW R. FIRST SET OF DESIGNS.)

This is how we will proceed on all trials. I would like to add that in every case the smaller figure will be present in the larger design. It will always be in the upright position. There may be several of the smaller figures in the same large design, but you are to look only for the one in the upright position. Work as quickly as you possibly can, but be sure that the figure you find is exactly the same as the original figure both in size and in proportions. As soon as you have found the figure, draw it in on the large figure. If you ever forget what the small figure looks like, you may turn the page over and check again. Are there any questions?

(READ DIRECTIONS AGAIN IF R. DOESN'T UNDERSTAND.)

On the following pages are patterns with a part left out. For each pattern, we would like you to choose one of the four possible parts that are given at the bottom of each pattern. All you have to do is choose one which is the right piece to complete the pattern. Each of the choices is the right shape to fit the space, but they do not all complete the pattern. When you have found the right part, write the number of it in the space that it belongs in the pattern. They are simple at the beginning and get harder as you go on. There is no catch. If you pay attention to the way the easy ones go, you will find the later ones less difficult. You have as much time as you like.

3:26 - 31

46. Do you have any pet peeves?

Yes 1
No 2 3:32

(IF YES) What are they?

47. When you have something important to do, do you generally do it right away, or put it off until the last minute?

Do it right away 1
Put it off till last minute . 2 3:33

48. When you hear or see a word you don't understand, what do you usually do? (READ CHOICES)

Continue reading or listening . 1
Stop and find out what it means 2 3:34

49. Generally, how do you keep in touch with out-of-town family and friends?

Telephone 1
Letter 2 3:35

50. Do you feel you express yourself better when you talk or when you write?

Talking 1
Writing 2 3:36

51. I'm going to read a list of statements to you. Please tell me if you strongly agree, agree, disagree, or strongly disagree with each statement.

- _____ If something grows up over a long time, there is bound to be much wisdom in it. 3:37
- _____ It's not really undemocratic to recognize that the world is divided into superior and inferior people. 3:38
- _____ You can usually depend more on a man if he owns property than if he does not. 3:39
- _____ If a person thinks a law is bad, he should try to change it, rather than disregard it. 3:41
- _____ Our society is so complicated that if you try to reform parts of it, you're likely to upset the whole system. 3:42
- _____ Private ownership of property is necessary if we are to have a strong nation. 3:43
- _____ There are existing laws that can and should be disregarded. 3:44
- _____ If you start to try to change things very much, you usually make them worse. 3:45
- _____ When I make plans, I am fairly sure that I can make them work. 3:46
- _____ Many times I feel that I have little influence over the way the government is run. 3:47
- _____ I do not believe that chance and luck are very important in my life. 3:48
- _____ It is important to keep your emotions out of all decisions. 3:49
- _____ Becoming a success is a matter of hard work; luck has little or nothing to do with it. 3:50
- _____ Your feelings are usually your best guide. 3:51
- _____ Getting a good job depends mainly on being in the right place at the right time. 3:52
- _____ There is really no such thing as "luck". 3:53

52. Are you employed?

Yes	1	
No	2	
Housewife ...	3	
Retired . . .	4	
Student . . .	5	3:54

53. What kind of work do you do for a living?
(PROBE FOR EXACT OCCUPATION)

(IF HOUSEWIFE OR STUDENT) Have you ever worked?
If so, what kind of work did you do?

(IF RETIRED) What kind of work did you do?

(IF UNEMPLOYED) Would you rather be working now?

54. Do you think of your job as a job you plan to have as a
career or just a way to make money? (IF NOT EMPLOYED,
USE PAST TENSE IN ASKING QUESTION.)

Career.	1	
Money	2	3:55

55. Is there anything else you'd rather be doing?

Yes	1	
No	2	3:56

(IF YES) What is that?

56. I'm going to read you a list of statements. Please tell me
if you strongly agree, agree, disagree, or strongly disagree
with each one. (USE PAST TENSE IF UNEMPLOYED)

_____ I really don't feel a sense of pride or
accomplishment as a result of the type
of work that I do. 3:57

_____ I'm satisfied with myself the way I am. 3:58

- _____ My work gives me a feeling of pride in having
done the job well. 3:59
- _____ I very much like the type of work that I am
doing. 3:60
- _____ My job gives me a chance to do the things
I do best. 3:61
- _____ My work is my most rewarding experience.
3:62

57. We'd like to find out about your educational background.
What is the highest level of school which you have completed?

- | | |
|---------------------------------------|---|
| Elementary School (1-6) | 1 |
| Junior High (7-9) | 2 |
| Some High School | 3 |
| High School Graduate | 4 |
| Some College | 5 |
| College Graduate | 6 |
| Some Graduate School | 7 |
| M.A. - Ph.D. - M.D. (advanced degree) | 1 |
| Technical Training (SPECIFY). | 2 |

3:63-64

58. What was the name of the (high school/college) you attended?
(ASK FOR NAME OF LAST SCHOOL ATTENDED)

59. When you were in high school (college), what kind of grades
did you get? (PROBE - DO YOU KNOW WHAT YOUR GRADE AVERAGE
WAS? WOULD YOU SAY YOU HAD A:)

- | | |
|-----------------------------|---|
| "A" average | 1 |
| Between "A" & "B" | 2 |
| "B" average | 3 |
| Between "B" & "C" | 4 |
| "C" average | 5 |
| Lower than "C" | 6 |
| Don't Know | 8 |

3:65

60. In high school, which did you enjoy the most?

- | | |
|---------------------------------------|---|
| Algebra | 1 |
| Geometry | 2 |
| Did not take either or both | 3 |

3:66

61. How would you classify yourself politically?
(IF NO ANSWER, THEN READ CHOICES)

Extreme Conservative	1	
Conservative	2	
Middle of the Road	3	
Liberal	4	
Very Liberal	5	
Radical Left	6	
Refuse to answer	7	3: 67

62. What is your religious preference?

Catholic	1	
Protestant (ASK DENOMINATION)	2	
Jewish	3	
Muslim	4	
Buddhist	5	
Agnostic	6	
Atheist	7	
Other	1	3:68-69

63. Is this the way you were raised?

Yes	1	
No	2	3: 70

(IF NO) How were you raised? 3: 71
(USE CODES FROM #62)

64. One last question in closing, in a few words, would you describe this interview?
(PROBE FOR EVEN A FEW COMMENTS. NOTE: WATCH EYE MOVEMENTS OF R. AS DESCRIPTION IS GIVEN. NOTE IF EYES MOVE TO THE RIGHT OR LEFT OR AT ALL.)

Time Interview Ended _____ Interviewer's Name _____

INTERVIEWER: FILL OUT ITEMS BELOW IMMEDIATELY AFTER LEAVING RESPONDENT.

If R. is interested in a final report of the study, they can give you their name and address and we will mail one to them. Remind them it may be at least six months before the report will be ready.

1. Sex: Male 1
Female 2 4:10

2. Respondent's Race White 1
Black 2 4:11

3. Study Location L.A. Adult Occupational Survey 1
L.A. Adult Residential Survey 2
L.A. Child Survey 3
Rural Survey 4
Hopi Survey 5 4:12

4. Date of Interview

A. Month: January 1
February 2
March 3 4:13

B. Day of Week-Sunday 1
Monday 2
Tuesday 3
Wednesday 4
Thursday 5
Friday 6
Saturday 7 4:14

5. COOPERATIVENESS OF RESPONDENT

Very cooperative 1
Somewhat cooperative 2
Not cooperative 3 4:15

6. INTEREST OF RESPONDENT

Very Interested 1
Somewhat Interested 2 4:16
Not Interested 3

7. Does Respondent wear wristwatch?

Yes 1
No 2
Didn't Check. 3 4:17

COMMENTS: NOTE INTERRUPTIONS, ANYONE ELSE PRESENT DURING
INTERVIEW, OVERALL REACTIONS OF R. TO INTERVIEW.
ALSO NOTE IF THERE WERE DISTRACTIONS DURING THE
INTERVIEW.

REFERENCES

- Allport, F. Theories of Perception and the Concept of Structures. New York: Wiley, 1955.
- Anderson, A.L. The effect of laterality localization of focal brain lesions on the Weschsler-Bellevue subtests. J.Clin. Psychol., 7, 1951, 149-153.
- Bakan, F. Hypnotizability, laterality of eye movements and functional brain asymmetry. Percept. and Motor Skills, 28, 1969, 927-932.
- _____. Left-lookers and Right-lookers. Psychology Today, 1971, 64-67.
- Balthazar, E.E.; Todd, R.E.; and Morrison, D.H. Visuo-constructive and verbal responses in chronic brain damaged patients and familial retardates. J. Clin. Psychol., 17, 1961, 193-196.
- Bard, O., and Brooks, C.M. Localized cortical control of some postural reactions in the cat and rat together with evidence that small cortical remnants may function normally. Res. Publ. Ass. Ner. Ment. Dis., 13, 1934, 107-157.
- Berth, E. The language behavior of negroes and whites. Pacific Sociol. Review, 4, 1961, _____.
- Barnouw, V. Culture and Personality. Homewood, Illinois: Dorsey, 1963
- Benton, A.L. and Joynt, R.J. Early descriptions of aphasia. Arch. Neurol., 3, 1960, 205-222.
- Berkeley-Hill, O. "The Aual-Erotic Factor in the Religion, philosophy, and Character of the Hindus", Intern.J. Psychoan. 2, 1921, 317-319.
- Bernstein, B. Elaborated and restricted codes: their social origins and some consequences. In A.G. Smith (ed.), Communication and Culture: Readings in the Codes of Human Interaction. New York: Holt, Rinehart, and Winston, 1966.
- Bogen, J.E. The other side of the brain I: dysgraphia and dyscopia following cerebral commissurotomy. Bull. Los Angeles Neurol. Soc., 34, 1969a, 73-105.
- _____. The other side of the brain II: an appositional mind. Bull. Los Angeles Neurol. Soc., 34, 1969b, 135-162.

- Bogen, J.E., and Bogen, G.M. The other side of the brain III: the corpus callosum and creativity. Bull. Los Angeles Neurol. Society, 34, 1969, 191-219.
- Bogen, J.E., Fisher, E.D., and Vogel, P.J. Cerebral commissurotomy: a second case report. J. Amer. Med. Assoc., 194, 1965, 1328-1329.
- Bogen, J.E. and Gazzaniga, M.S. Cerebral commissurotomy in man: minor hemisphere dominance for certain visuospatial functions. J. Neurosurg., 23, 1965, 394-399.
- Bogen, J.E., Sperry, R.W., and Vogel, P.J. Commissural section and the propagation of seizures. In H.H. Jasper (ed.), Basic Mechanisms of the Epilepsies.
- Bogen, J.E. and Vogel, P.J. Cerebral commissurotomy in man: preliminary report. Bull. Los Angeles Neurol. Society, 27, 1962, 169-172.
- Botez, M., and Wertheim, N. Expressive aphasia and amusia following right frontal lesions in a right-handed man. Brain, 82, 1959, 186-202.
- Boyer, W.H., and Walsh, P. Are children born unequal? Saturday Review, 19, 1968, 61-79.
- Brain, W.H. Speech Disorders (2nd. ed.) Washington, D.C. Butterworth, 1965.
- Brown, H.R. Die Nigger Die New York: Dial Press, 1969.
- Bryden, M.P. Tachistoscopic recognition of non-alphabetical material. Canad. J. Psychol., 14, 1960, 78-86.
- Cohen, B., et.al. Functional asymmetry of the human brain. Science, 162, 1968, 475-476.
- Cohen, R.A. Conceptual styles, culture conflicts, and nonverbal tests of intelligence. Amer. Anthropologist, 71, 1969, 828-856.
- Corkin, S. Tactually-guided maze learning in: effects of unilateral cortical excisions and bilateral hippocampal lesions. Neuropsychologia, 3, 1965, 339-351.
- Costa, L.D. and Baughn. Performance of patients with lateralized cerebral lesions: I. Verbal and perceptual tests. J. Neuro. Ment. Dis., 134, 1962, 162-168.
- Critchley, M. The Parietal Lobes. London: E. Arnold, 1953.

- Crockett, H.G. and Estridge, N.M. Cerebral hemispherectomy. Bull. Los Angeles Neurol. Society, 16, 1951, 7-87.
- Day, M.E. An eye-movement indicator of individual differences in the physiological organization of attentional processes and anxiety. J.Psychol., 66, 1967, 51-62
- _____. Attention, anxiety and psychotherapy. Psychopharmacy: Theory Research, and Practice, 5, 1968, 146-149.
- Deutsch, M. Happenings on the way to the forum. Harvard Ed. Review 39, 1969, 523-557.
- Devereux, G. Cultural and characterological traits of the Mojave related to the anal stage of psychosexual development. Psychoan. Quarterly, 20, 1951, 400-405.
- Dide, M. Diagnostic anatoma-clinique de desorientations temporo-spatiales. Rev. Neurol., 69, 1938, 720-723.
- Domhoff, G.W. But why did they sit on the King's right hand in the first place? Psychoan. Review, 56, 1970, 586-596
- Ellul, The Technological Society, Trans. J. Wilkinson. New York: A.A. Knopf, 1964.
- Ettlinger, G., Warrington, E., and Zangwill, O. A further study of visual spatial agnosia. Brain, 80, 1957, 335-361.
- Freud, S. Collected Papers, Vol. IV. London: Hogarth Press. 1946.
- Frolov, Y.P. Pavlov and His School. New York: Oxford University Press, 1937.
- Galbraith, J.K. The New Industrial State. Boston: Houghton Mifflin, 1967.
- Gazzaniga, M.S. and Sperry, R.W. Simultaneous double discrimination response following brain besection. Psychoan.Sci., 4, 1966, 261-262.
- Geschwind, N., and Levinsky, W. Human brain: left-right asymmetries in temporal speech region. Science, 161, 1968, 186-187
- Griffith, H., and Davidson, M. Long-term changes in intellect and behavior after hemispherectomy. J.Neurol.Neurosurg.Psychiat., 24, 1961, 240-249.
- Grigsby, E. The urban teacher, his pupils, and the language barrier. Education and Urban Society, 2, 1970, 157-167.

- Guttman, L. The quantification of a class of attributes. In P.H. Lazarsfeld(ed.), Mathematical Thinking in the Social Sciences. Glencoe: Free Press, 1954, 216-257.
- Head, A. Aphasia and Kindred Disorders of Speech. Vol.I. New York: Hafner, 1963 (originally 1926).
- Hebb, D.O. The effects of early and later brain injury upon test-scores and the nature of normal adult intelligence. Proc. Amer. Philosophical Soc., 85, 1942, 275-292.
- _____. The Organization of Behavior: A Neuropsychological Theory. New York: John Wiley and Sons, Inc., 1949.
- Hecaen, H. Clinical Symptomatology in Right and Left Hemispheric Lesions. In V.B. Mountcastle (ed.), Interhemispheric Relations and Cerebral Dominance. Baltimore: John Hopkins University Press, 1962.
- Hecaen, H., and Angelergues, R. La Cecite Psychique: etude critique de la notion d'agnosie. Paris: Masson, 1963.
- Henschen, S.E. On the function of the right hemisphere of the brain in relation to the left in speech, music, and calculation. Brain. 49, 1926, 110-123.
- Heron, W. Perception as a function of retinal locus and attention. American J. Psychol., 70, 1957, 38-48.
- Hertz, R. Death and the Right Hand. Glencoe: The Free Press, 1960. First published in 1907.
- Houlier, H. Language in Culture. Chicago: Univ. of Chicago Press, 1954.
- Jacobs, J. Onze rechthandigheid. Amsterdam: 1892.
- Jackson, J.H. In J. Taylor (ed.), Selected Writing of John Hughlings Jackson. New York: Basic Books, 1958.
- Jensen, A.R. How much can we boost IQ and Scholastic Achievement? Harvard Ed. Review, 1969a, 39,1-123.
- _____. Reducing the heredity-environment uncertainty: a reply. Harvard Ed. Review, 39, 1969b, 449-483
- Johnson, K. Teaching culturally disadvantaged pupils. Chicago: Research Associates, 1967
- Kimura, M. Right temporal-lobe damage: perception of unfamiliar stimuli after damage. Arch.Neurol., 8, 1963, 264-271.

Kimura, M. Left-right differences in the perception of melodies .
Q.J. of Experim. Psych., 16, 1964, 355-358.

_____. Dual functional asymmetry of the brain in visual
perception. Neuro-psychologia, 4, 1966, 275-285.

_____. Functional asymmetry of the brain dichotic listening.
Cortex, 3, 1967, 163-178.

Kimura, M., and Folb, S. Neurol processing of backwards-speech
sounds. Science, 161, 1968, 395-396.

Kretschmer, E. The Psychology of Men of Genius. London: Kagen
Paul, 1931.

Layton, W.L. The Strong Vocational Interest Blank. Minneapolis:
Univ. of Minn. Press, 1960.

Lee, D. Lineal and nonlinear codification of reality. Psycho-
somatic Medicine, 12, 1950, 89-97.

Levi-Strauss, C. The Raw and the Cooked. New York; Harper, 1964.

Light, R.J., and Smith, P.V. Social allocation models of in-
telligence. Harvard Ed. Review, 39, 1969, 484-510.

Lombroso, C. Lefthanders, North Amer. Review, 177, 1903, 440.

Luria, A.R. Higher Cortical Function in Man. New York: Basic
Books, 1966a.

_____. Human Brain and Psychological Processes. New York:
Harper and Row, 1966b.

Marcuse, H. Reason and Revolution: Hegel and the Rise of Social
Theory. Oxford: Oxford Univ. Press, 1941.

_____. One-Dimensional Man, Boston; Beacon Press, 1964.

McDaniel, P.A. and Babchuk, N. Negro conceptions of white people
in a northeast city. Ethylon, 21, 1960, 7-19.

McPie, J., and Zangwell, O.L. Visual-constructive disabilities
associated with lesions of the left cerebral hemisphere.
Brain, 83, 1960, 243-260.

McLuhan, M. The Gutenberg Galaxy. Toronto: Univ. Of Toronto
Press, 1962

_____. Understanding Media. New York: McGraw-Hill, 1964

_____. Playboy interview. Playboy, 158, 1969, 53-54.

- McLuhan, M. The reversal of the overheated. Playboy, 1969
- McLuhan, M. and Piore, Q. The Medium is the Message. New York: Bantam Books, 1967
- Mills, C.W. Language, Logic, and Culture. Amer. Socio. Rev., 4, 1939, 670-680.
- Milner, B. Psychological defects produced by temporal lobe excision. Res. publ. ass. nerv. ment. dis., 36, 1958, 244-257.
- _____. Laterality effects in audition. In V.B. Mountcastle (ed.), Interhemispheric relations and cerebral dominance. Baltimore: John Hopkins University Press, 1962.
- _____. Visually-guided maze learning in man: effects of bilateral hippocampal, bilateral frontal, and unilateral cerebral lesions. Neuropsychologia, 3, 1965, 317-338.
- _____. Visual recognition and recall after right temporal-lobe excision in man. Neuropsychologia, 6, 1968, 191-209.
- Mishkin, M., and Porgays, D.G. Word recognition as a function of retinal locus. J. Exp. Psycho 1., 43, 1952, 43-48.
- Mullan, S., and Penfield, W. Illusions of comparative interpretation and emotion: production by epileptic discharge and by electrical stimulation in the temporal cortex. Arch. Neurol. Psychiatry, 81, 1959, 269-284.
- Myers, R.E. Function of corpus callosum in interocular transfer. Brain, 79, 1956, 358-363.
- Myers, R.E., and Sperry, R.W. Interocular transfer of a visual form discrimination habit in cats after section of the optic chiasma and corpus callosum. Anat. Record, 115, 1953, 351-352.
- _____. Interhemispheric communication through the corpus callosum: mnemonic carry-over between the hemispheres. Arch. Neurol. Psychiat., 80, 1968, 298-303.
- Nielson, J.M. Unilateral cerebral dominance as related to mind blindness: minimal lesion capable of causing agnosia for objects. Arch. Neurol. Psychiatry, 38, 1937, 108-135.
- Passow, H., (ed.) Education in depressed areas, New York: Teachers College Press, 1968.

- Piercy, M. The effects of cerebral lesions on intellectual function: a review of current research trends. Brit. J. Psychiatry, 110, 1964, 310-352.
- Polanyi, M. The Tacit Dimension. Garden City, New York: Doubleday, 1966.
- Powell, C.A. Tachistoscopic recognition of unfamiliar visual material. Unpublished B.A. Thesis. McGill Univ., 1962.
- Reitan, R.M. A research program on the psychological effects of brain lesions in human beings. In N.R. Ellis (ed.) International Review of Research in Mental Retardation. New York: Academic Press, 1966.
- Riesman, F. The culturally deprived child. New York: Harper and Row, 1962.
- Rosenthal, R., and Jacobsen, L.P. Pygmalion in the Classroom. New York: Holt, 1968.
- Roszak, T. The Making of a Counter-Culture. New York: McGraw-hill, 1969.
- Seidenberg, Posthistoric Man. Chapel Hill, N.C.: Univ. of North Carolina Press, 1950.
- Shankweiler, D. Effects of temporal lobe damage on perception of dichotically presented melodies. Q.J. Exp. Psychol., 62, 1966, 115-119.
- Smith, A. Speech and other functions after left (dominant) hemispherectomy. J. Neurol. Neurosurg. Psychiatry, 29, 1966, 467-471.
- _____. Nondominant demispherectomy. Neurology, 19, 1969, 442-445.
- Smith, A., and Burklund, C.W. Dominant hemispherectomy: preliminary report on neurological sequelae. Science, 152, 1966, 1280-1282.
- Smith, I.M. The form-perception factor. A study of a variety of form relation tests, of the existence of a factor of form-perception and of its relation to success in school subjects. Ed. B. Thesis. Univ. of Glasgow, 1937. Summary in Brit. J. Educ. Psychol., 3, 1938, 1.
- _____. Spatial Ability: Its Educational and Social Significance. San Diego, California: Knapp, 1964.

- Spearman, C. and W. Jones. Human Ability. London: Macmillan, 1950.
- Sperry, R.W. Some development in brain lesion studies of learning. Fed.Proc., 20, 1961b, 609-616.
- Street, R. A Gestalt Completion Test. New York: Bureau of Publications, Teachers College, Columbia University, 1931.
- Sultan, E.E. A factorial study in the domain of creative thinking. Abstract of M.A. Thesis, Brit. J. Educ. Psychol., 32, 1962, 78-82.
- TenHouten, W.D. Scale gradient analysis: a statistical method for constructing and evaluating guttman scales. Sociometry, 1969.
- Terrace, H.S. The effects of retinal locus and attention on the perception of words. J. Exp. Psychol., 58, 1959, 382-385.
- Trevarthen, C.B. Double visual learning split-brain monkeys. Science, 136, 1952, 258-259.
- Von Bonin, G. Anatomical asymmetries of the cerebral hemisphere. In V.B. Mountcastle (ed.), Interhemispheric relation and cerebral dominance. Baltimore: John Hopkins University Press, 1962.
- Warrington, E.K., James, M., and Kinsbourne, M. Drawing disability in relation to laterality of cerebral lesions. Brain, 89, 1966, 53-82.
- Weinstein, S. Differences in effects of brain wounds implicating right or left hemispheres. In V.B. Mountcastle(ed.), Interhemispheric relations and cerebral dominance. Baltimore: John Hopkins University Press, 1962.
- Weisenburg, T., and McBride, K.E. Aphasia: a clinical and psychological study. New York: Commonwealth Fund, 1935.
- Wertheim, N. Disturbances of the musical functions. In L. Halpern (ed.), Problems of Dynamic Neurology. Jerusalem: Hebrew Univ. Hadassah Medical School, 1963.
- Waters, F. Book of the Hopi. New York: Ballantine, 1963.
- Wechsler, D. The measurement of adult intelligence (2nd. ed.) Baltimore: William and Williams, 1941.
- _____. Wechsler Adult Intelligence Scale. New York: The Psychological Corporation, 1955.

Welsh, G.S. and Barron, F. Barron-Welsh Art Scale. Palo Alto, Calif.: Consulting Psychologists Press, 1949.

Whorf, B. Language, Thought, and Reality. Cambridge, Mass.: The M.I.T. Press, 1956.

Wigan, A.L. The duality of the mind. London: Longman, 1844

Wilhelm, R. (Trans.), C.F. Baynes (Trans.) The I Ching. Princeton, N.J.: Princeton Univ. Press, 1950.

Wilkinson, J. (ed.) Technology and Human Values. Santa Barbara, Calif.: Center for the Study of Democratic Institutions, 1967.

Witkin, H.A., Dyk, R.B., Paterson, H.F., Goodenough, D.E., and S.Karp. Psychological Differentiation. New York: 1962.

Witkin, H.A., Lewis, H.B., Hertzman, M., Machover, K., Meissner, P.B., and S. Wagner. Personality Through Perception. New York: Harper, 1954.

Wyke, M., and Ettlinger, G. Efficiency of recognition in left and right visual fields. Arch. Neurol., 5, 1961, 659-665.

Zangwill, O.L. Asymmetry of cerebral hemisphere function. In H. Garland (ed.), Scientific Aspects of Neurology. London: E and S Livingstone, 1961.

_____. Intelligence in Aphasia. In _____ De Reuck and _____ O'Connor (eds.), Disorders of Language, Boston: Little, Brown, and Co., 1964.

Zollinger, R. Removal of left cerebral hemisphere. Arch. Neurol. Psychiatry, 34, 1935, 1055-1062.